



1994 SUSQUEHANNA RIVER BASIN WATER QUALITY ASSESSMENT REPORT

(305(b) REPORT)

SUSQUEHANNA RIVER BASIN COMMISSION

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(305(b) REPORT)

BY

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Division of Water Quality and Monitoring Program



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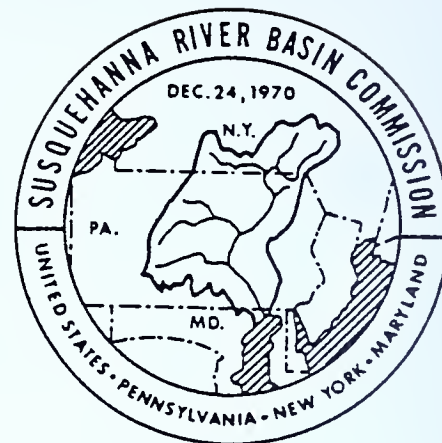
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The Susquehanna River Basin was created as an independent agency by a federal-interstate compact* among the states of Maryland, New York, Commonwealth of Pennsylvania, and the federal government. In creating the Commission, the Congress and state legislatures formally recognized the water resources of the Susquehanna River Basin as a regional asset vested with local, state, and national interests for which all the parties share responsibility. As the single federal-interstate water resources agency with basinwide authority, the Commission's goal is to effect coordinated planning, conservation, management, utilization, development and control of basin water resources among the government and private sectors.

**Statutory Citations: Federal - Pub. L. 91-575, 84 Stat. 1509 (December 1970); Maryland - Natural Resources Sec. 8-301 (Michie 1974); New York - ECL Sec. 21-1301 (McKinney 1973); and Pennsylvania - 32 P.S. 820.1 (Supp. 1976).*

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CONTENTS

PART I: EXECUTIVE SUMMARY.....	1
PART II: BACKGROUND	2
Total Waters	2
Summary of Classified Uses	2
PART III: SURFACE WATER QUALITY ASSESSMENT	6
Chapter One: Surface Water Monitoring Program	6
Fixed Station Nutrient Monitoring Network	6
Interstate Stream Water Quality Network	7
Water Quality and Biological Subbasin Surveys	8
Priority Water Body Surveys	8
Monitoring/Data Management Needs	9
Chapter Two: Assessment Methodology and Summary Data	9
Assessment Methodology	9
Water Quality Summary	10
Section 303(d) Waters	12
Chapter Three: Rivers and Streams Water Quality Assessment	13
<i>Chemung Subbasin</i>	13
Designated Use Support	13
Causes and Sources of Nonsupport of Designated Uses	15
<i>Eastern Subbasin</i>	
Designated Use Support	18
Causes and Sources of Nonsupport of Designated Uses	18
<i>Upper Susquehanna Subbasin</i>	23
Designated Use Support	23
Causes and Sources of Nonsupport of Designated Uses	25

<i>West Branch Susquehanna Subbasin</i>	28
Designated Use Support	28
Causes and Sources of Nonsupport of Designated Uses	28
<i>Juniata Subbasin</i>	33
Designated Use Support	33
Causes and Sources of Nonsupport of Designated Uses	33
<i>Lower Susquehanna Subbasin</i>	37
Designated Use Support	37
Causes and Sources of Nonsupport of Designated Uses	39
Chapter Four: Lake Water Quality Assessment	41
Chapter Five: Estuary and Coastal Assessment	42
Chapter Six: Wetlands Assessment	42
Chapter Seven: Public Health/Aquatic Life Concerns	42
PART IV: GROUND-WATER ASSESSMENT	44
Overview	44
SRBC Ground-Water Program	45
PART V: WATER POLLUTION CONTROL PROGRAM	46
Chapter One: Point Source Control Program	46
Chapter Two: Nonpoint Source Control Program	46
Chapter Three: Cost/Benefit Analysis	46
Chapter Four: Special State Concerns and Recommendations	46
Acid Mine Drainage	46
Chesapeake Bay	47
Future Goals	47
REFERENCES	65

APPENDICES

A.	Water Classification And Best Usage Relationships	49
B.	Impaired Stream Reaches in the Susquehanna River Basin by Subbasin	53

TABLES

1.	Susquehanna River Basin Atlas	3
2.	Summary of Stream Classifications in the Susquehanna River Basin	5
3.	Susquehanna River Basin Overall Use Support Summary for Rivers and Streams	10
4.	Susquehanna River Basin Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses by Various Cause Categories	11
5.	Susquehanna River Basin Total Sizes of Water Not Fully Supporting and Partially Supporting Uses by Various Source Categories	12
6.	Chemung Subbasin Overall Use Support Summary for Rivers and Streams	13
7.	Chemung Subbasin Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses by Various Cause Categories	16
8.	Chemung Subbasin Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses by Various Source Categories	17
9.	Eastern Subbasin Overall Use Support Summary for Rivers and Streams	18
10.	Eastern Subbasin Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses by Various Cause Categories	21
11.	Eastern Subbasin Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses by Various Source Categories	22
12.	Upper Susquehanna Subbasin Overall Use Support Summary for Rivers and Streams	23
13.	Upper Susquehanna Subbasin Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses by Various Cause Categories	26
14.	Upper Susquehanna Subbasin Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses by Various Source Categories	27
15.	West Branch Susquehanna Subbasin Overall Use Support Summary for Rivers and Streams	28
16.	West Branch Susquehanna Subbasin Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses by Various Cause Categories	31
17.	West Branch Susquehanna Subbasin Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses by Various Source Categories	32
18.	Juniata Subbasin Overall Use Support Summary for Rivers and Streams	33
19.	Juniata Subbasin Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses by Various Cause Categories	35
20.	Juniata Subbasin Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses by Various Source Categories	36

21.	Lower Susquehanna Subbasin Overall Use Support Summary for Rivers and Streams	37
22.	Lower Susquehanna Subbasin Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses by Various Cause Categories	40
23.	Lower Susquehanna Subbasin Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses by Various Source Categories	41
24.	Toxic Contamination/Public Health Impacts	43
B1.	Impaired Stream Reaches in the Chemung Subbasin	54
B2.	Impaired Stream Reaches in the Eastern Subbasin	55
B3.	Impaired Stream Reaches in the Upper Susquehanna Subbasin	56
B4.	Impaired Stream Reaches in the West Branch Susquehanna Subbasin	57
B5.	Impaired Stream Reaches in the Juniata Subbasin	62
B6.	Impaired Stream Reaches in the Lower Susquehanna Subbasin	63

ILLUSTRATIONS

1.	Map Showing the Susquehanna River Basin	4
2.	Fixed-Station Nutrient Monitoring Network	6
3.	Interstate Stream Water Quality Network	7
4.	Map Showing the Chemung Subbasin	14
5.	Map Showing the Eastern Subbasin	19
6.	Map Showing the Upper Susquehanna Subbasin	24
7.	Map Showing the West Branch Susquehanna Subbasin	29
8.	Map Showing the Juniata Subbasin	34
9.	Map Showing the Lower Susquehanna Basin	38

PART I: EXECUTIVE SUMMARY

This report was prepared to meet the requirements of Section 305(b) of the Clean Water Act. The report format follows that requested by the U.S. Environmental Protection Agency in its "Guidelines for Preparation of the 1994 State Water Quality Assessments (305(b) Reports)."

The Susquehanna River drains 27,510 square miles from parts of the three states of New York, Pennsylvania, and Maryland, contributing over half of the freshwater inflow to the Chesapeake Bay. This report assesses 17,464 stream miles of the 31,193 stream miles in the Susquehanna River Basin. Nearly 15,710 stream miles, or 90 percent of the stream miles assessed, fully support designated stream uses and thus, the Clean Water Act's fishable/swimmable goal.

Ground water quality in the basin is of adequate quality for most uses. Many of the ground water quality problems in the basin are related to naturally dissolved constituents of the geologic unit from which the water originates. Other than agricultural nonpoint sources, most of the man-induced problems are localized and confined to a small number of wells.

Major causes of stream impairment are metals and low pH, primarily from historical coal mining activities. Nutrient enrichment and siltation of streams from agricultural runoff and municipal discharges are other causes of significant stream impairment in the basin.

The Susquehanna River Basin Commission's (SRBC) monitoring program has evolved from the Commission's role in interstate and regional issues. The nutrients nitrogen and phosphorus are monitored on the main stem of the Susquehanna River and its major tributaries to assist the Chesapeake Bay Program in meeting its goals. SRBC also established an interstate water quality monitoring network to evaluate streams crossing state lines for compliance with state water quality standards. Finally, regional water quality and biological conditions in the basin are addressed through six subbasin surveys. These monitoring networks not only meet program objectives, but also provide information to assess streams for the purpose of the 305(b) report.

PART II: BACKGROUND

The Susquehanna River drains the largest basin on the Atlantic coast of the United States and is the sixteenth largest river in the United States. It originates at Otsego Lake, New York, and flows 444 miles to the Chesapeake Bay at Harve de Grace, Maryland. The 27,510-square-mile Susquehanna River Basin drains parts of New York, Pennsylvania and Maryland, and provides over half of the freshwater inflow to the Chesapeake Bay. Although relatively undeveloped, the basin's water resources have experienced degradation and overusage.

Total Waters

The information presented in Table 1 and Figure 1 provides a general perspective of the Susquehanna River Basin's water and land resources.

Summary of Classified Uses

Three different state lists (Table 2) define the classes of streams in the Susquehanna River Basin. Stream classifications are based on a combination of aquatic life, water supply, and recreational uses.

TABLE 1. Susquehanna River Basin Atlas

Basin Population ¹	3.85 million
Basin Surface Area ²	27,510 sq. mi.
- New York	6,327 sq. mi.
- Pennsylvania	20,908 sq. mi.
- Maryland	275 sq. mi.
Number of Water Subbasins ³	6
- Chemung	2,604 sq. mi.
- Eastern	4,944 sq. mi.
- Upper Susquehanna	3,755 sq. mi.
- West Branch Susquehanna	6,992 sq. mi.
- Juniata	3,406 sq. mi.
- Lower Susquehanna	5,809 sq. mi.
Total miles of rivers and streams ⁴	31,193.0 mi.
- Miles of perennial rivers/streams	26,064.0 mi.
- Miles of intermittent streams	5,500.7 mi.
- Miles of ditches and canals	45.3 mi.
- Border miles of shared rivers/streams	0.0 mi.
Number of lakes/reservoirs/ponds ⁴	2,293
Acres of lakes/reservoirs/ponds ⁴	79,687 acres
Square miles of estuaries/harbors/bays ⁴	0 sq. mi.
Miles of ocean coast ⁴	0 mi.
Miles of Great Lake shores ⁴	0 mi.
Acres of freshwater wetlands ⁴	unknown
Acres of tidal wetlands ⁴	0 acres
Land use ⁵	
- Forested	(63.1%) or 17,362 sq. mi.
- Urban	(9.3%) or 2,560 sq. mi.
- Pasture	(6.7%) or 1,845 sq. mi.
- Agriculture (Cropland)	(19.7%) or 5,338 sq. mi.
- Water	(1.47%) or 405 sq. mi.

Sources of Information

1 U.S. Bureau of the Census, 1991.

2,3 Susquehanna River Basin Study Coordination Committee, 1970.

4 US EPA, 1993b.

5 Ott and others, 1991.

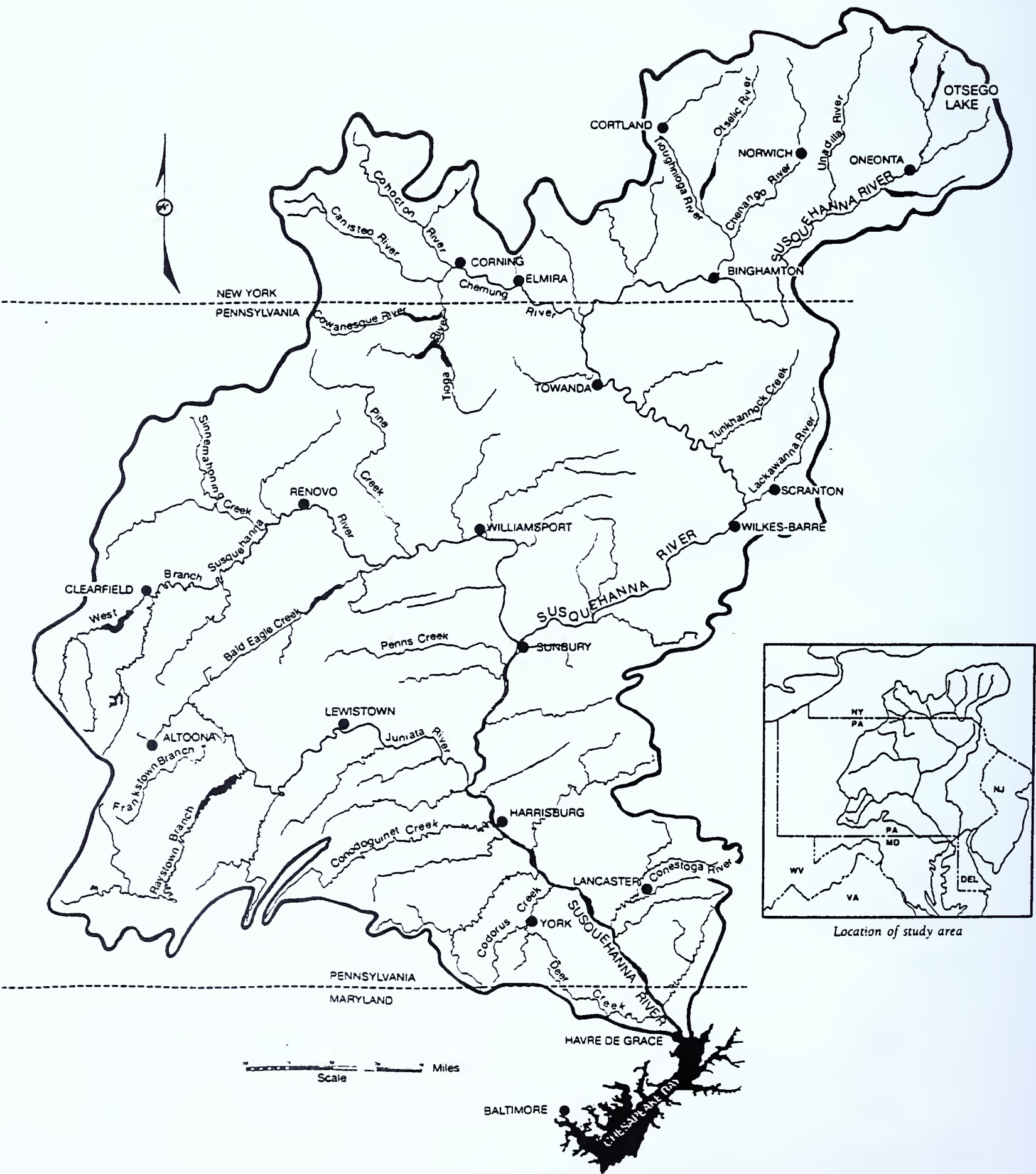


FIGURE 1. Map Showing the Susquehanna River Basin

TABLE 2. Summary of Stream Classifications in the Susquehanna River Basin

State	Classification*	Total Miles	Fishable/Swimmable
New York	A	13.20	13.20
	A(T)	7.80	7.80
	A(TS)	3.70	3.70
	AA	0.90	0.90
	B	307.16	210.76
	B(T)	19.34	19.34
	C	1,880.50	1,699.10
	C(T)	929.62	897.07
	C(TS)	235.91	228.81
	D	4.10	4.10
Pennsylvania	WWF	3,439.40	2,757.75
	HQ-WWF	15.70	15.70
	TSF	1,575.15	1,414.85
	HQ-TSF	267.53	258.53
	CWF	4,635.33	4,156.66
	HQ-CWF	3,456.99	3,374.03
	EV	309.92	309.92
	Classes with MF	238.88	238.88
Maryland	I-P	44.20	40.20
	III-P	20.42	14.89
	IV-P	57.80	44.50
	TOTAL	17,463.55	15,710.69

* see Appendix A for definitions

PART III: SURFACE WATER QUALITY ASSESSMENT

Chapter One: Surface Water Monitoring Program

Fixed-Station Nutrient Monitoring Network

US EPA's September 1983 Management Study, Chesapeake Bay: A Framework for Action, states that the Susquehanna River Basin is dominated by nonpoint sources, which account for 90 percent of the nitrogen and 76 percent of the phosphorus loads within the Susquehanna basin. In response, the Susquehanna River and its major tributaries have been continuously monitored for nutrients and suspended sediment since 1985.

The objectives of this study are to collect monthly base flow and seasonal-storm nutrient and suspended-sediment samples from the main stem of the Susquehanna River and its major tributaries and to compute annual loading rates. The monitoring network (Figure 2) establishes a sound database that is used to evaluate immediate and long-range nutrient reduction efforts.

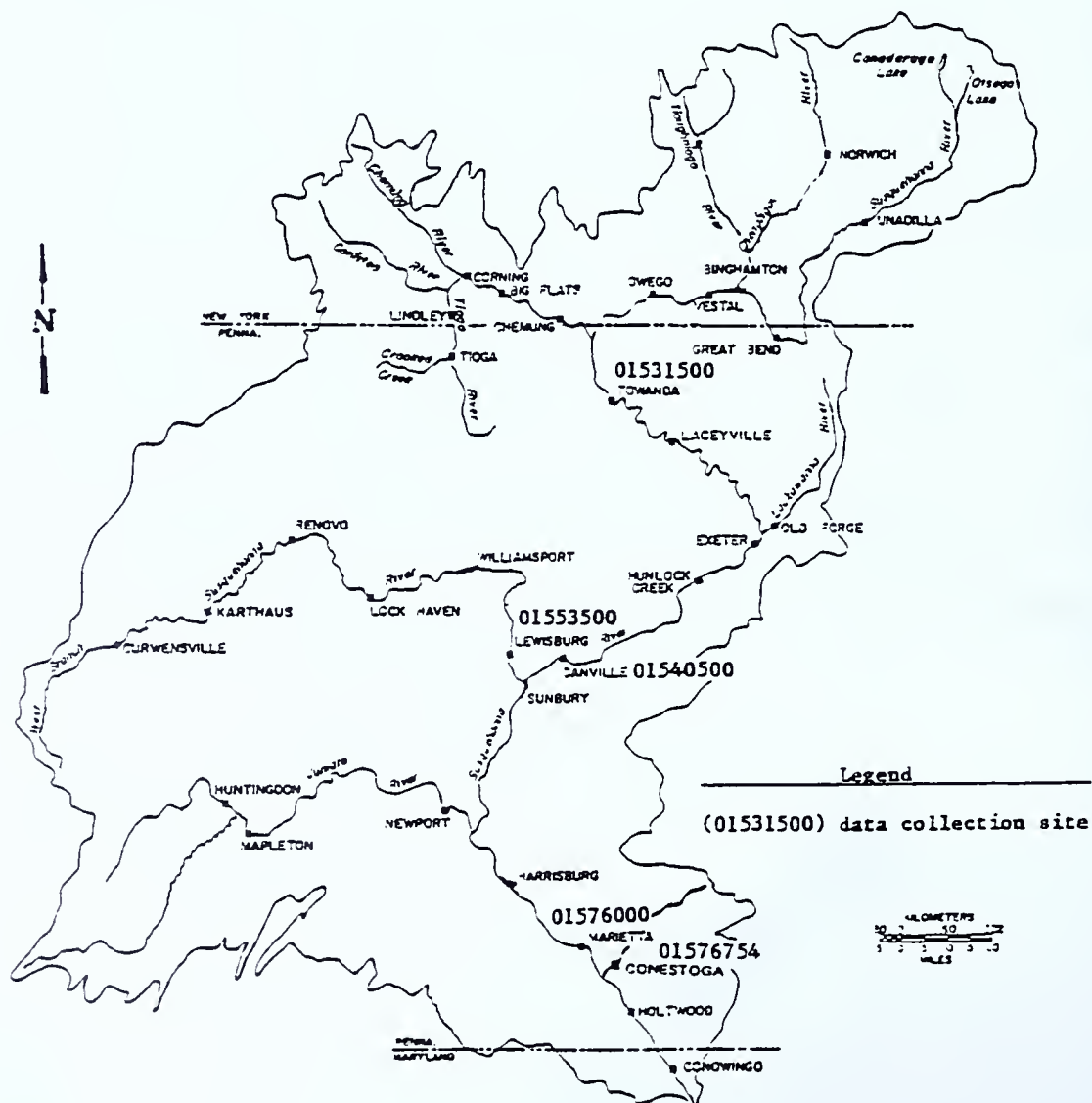


FIGURE 2. Fixed-Station Nutrient Monitoring Network

Interstate Stream Water Quality Network

An interstate stream water quality monitoring network (ISWQN) was established in 1986 to monitor the quality of streams crossing state boundaries (Figure 3). The ISWQN was established because monitoring programs conducted by New York, Pennsylvania, and Maryland do not cover all of the interstate streams and do not produce comparable data. The network was established to assess compliance with state water quality standards, to characterize stream quality and seasonal variations, and to build a database for future water quality trend assessment.

The network includes bimonthly samples at 15 interstate stream stations with each sample analyzed for 33 water quality indicators. An annual water quality and biological sampling is also incorporated in the network for 29 stations (includes the original 15 stations). Biological monitoring involves collecting and analyzing benthic macroinvertebrates to evaluate the conditions of the interstate streams. Streamflow data are also included.

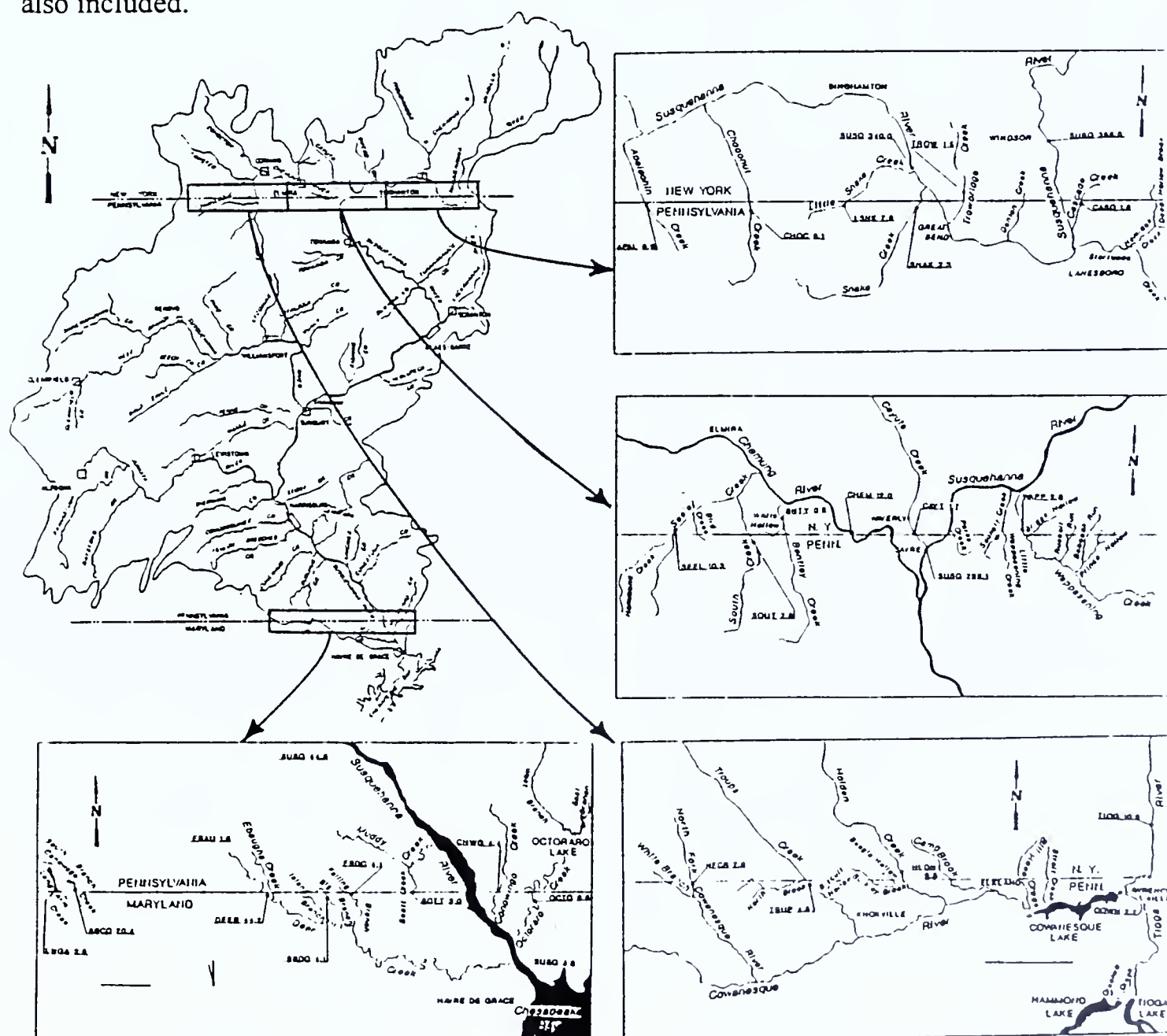


FIGURE 3. Interstate Stream Water Quality Network

Water Quality and Biological Subbasin Surveys

The SRBC began conducting the first round of intensive subbasin surveys in 1982. A second round of surveys began in mid-1993. The chemical and biological investigations are conducted to assess the condition of streams in the basin, identify impaired stream reaches and sources of impairment, provide a screening tool for many streams for possible further investigations, compare most current assessments with historical data, and provide data for the biennial 305(b) reports.

The surveys are designed to rotate among six major subbasins, sampling a subbasin once every ten years. In a three-week period, as many as 60 to 90 stations are sampled once in each subbasin. Sampling is conducted during non-storm conditions during mid-summer. Stations on the main river in each subbasin are located upstream and downstream from major tributaries and significant point sources. On tributary streams, stations are located near the mouth and at a mid-point upstream, depending on the character of the watershed.

Water quality analyses include 37 indicators for nutrients, metals, and physical parameters. Biological samples include collecting and analyzing benthic macroinvertebrates to evaluate the stream conditions. Habitat assessments were also completed utilizing EPA's Rapid Bioassessment Protocols.

Priority Water Body Surveys

Since 1983, Pennsylvania has used the priority water body survey (PWBS) concept, as encouraged by EPA. To support the Pennsylvania Department of Environmental Resources' (Pa. DER) ongoing water quality assessment and National Pollutant Discharge Elimination System (NPDES) permit issuance program, the SRBC has assisted Pa. DER in conducting PWBSs. Assisting in the states' water resource programs is part of SRBC's goals to be responsive to water-resource management needs of SRBC's signatory members.

The principal emphasis of the PWBS activity is the collection of field data to more accurately establish the need for water quality based effluent limitations for toxic pollutants in municipal sewage and industrial waste discharges permitted under the NPDES. The effluent limitations are based on acute and chronic aquatic life criteria and the mixing characteristics of the waste effluent on the receiving stream.

SRBC's responsibilities are to plan, assign, and organize field collection activities; document discharge/stream mixing characteristics at several discharge points along the stream of concern; collect physical/chemical data of streams and discharges, including temperature, pH, dissolved oxygen, conductance and stream morphology; and report findings to the Pa. DER, Bureau of Water Quality Management.

Monitoring/Data Management Needs

The emergence of computer technologies such as geographic information systems (GIS) have created new and powerful tools for the water resource professional. The use of GIS technology as a tool for stream assessments could link the traditional water quality database with geographic data to portray graphic and tabular outputs of various water resource relationships. For example, we could do a better job of determining cause and effect relationships in streams if we fully implemented the GIS tools and linked GIS to water quality models. If a station we sampled showed degraded conditions from some unknown source, the GIS could provide some insight of that unknown source by mapping NPDES discharge sites, landfill sites, industries, etc., with the pollutants known to be associated with those sites. This may provide some indication of the possible sources of contaminants related to the impaired stream reach being assessed.

Chapter Two: Assessment Methodology and Summary Data

Assessment Methodology

The SRBC's water quality assessment program is designed to determine whether the waters of the basin meet the water quality standards of the state in which the stream is located and to coordinate standards among states to avoid conflicts on interstate streams. These standards, which are specific to each of SRBC's three state signatory members, are based on protected uses and water quality criteria to prevent stream degradation.

Reach assessments are based on data from SRBC's interstate and subbasin stream surveys, federal and state agency surveys, consultants' environmental impact assessments and state bulletins and registers. Other stream assessments are based on land use data, topographic map data, reach classifications, and knowledge of activities in a watershed. Assessments based on ambient biological or chemical data are considered monitored. Evaluated assessments are based on other information such as maps, general knowledge of areas, descriptive reports, and historical water quality data.

The approach in determining stream use support status generally follows the guidelines provided in Appendix B of the Guidelines for Preparation of the 1994 State Water Quality Assessments (305(b) Reports) (US EPA, 1993a).

Data gathered on the status of the basin's streams have been stored in SRBC's water quality assessment database. The summaries generated from this system appear in this report. This database is similar to the EPA Water Body System (WBS), but is incompatible with EPA computer systems. SRBC plans to review the WBS software to evaluate the feasibility of converting to the WBS format.

Water Quality Summary

There are approximately 31,193 miles of named streams in the Susquehanna River Basin (EPA Total Waters Database, 1993), of which 17,464 stream miles, or 56 percent, are assessed in this report. This is an increase of 4,097 stream miles, primarily due to the addition of stream reaches from the Chemung Subbasin and new stream reaches assessed since the last reporting cycle. However, the percentage of stream miles assessed has decreased, namely from the increased estimates of stream miles by EPA's Total Waters Database. Reach specific data by subbasin is given in Appendix B.

Over 90 percent of the assessed stream miles meet designated uses (Table 3). This represents 15,709.5 miles of assessed streams.

**TABLE 3. Susquehanna River Basin Overall Use Support Summary
for Rivers and Streams**

(in miles)

Degree of Use Support	Assessment Category		Total Assessed
	Evaluated	Monitored	
Size Fully Supporting	10,706.50	5,003.06	15,709.56
Size Partially Supporting	22.75	640.62	663.37
Size Not Supporting	116.88	973.78	1,090.66
TOTAL ASSESSED	10,846.09	6,617.46	17,463.59

Partial support of designated uses is reported for 4 percent (663.37 miles) of the assessed miles. Partial support is reported when a designated use is marginally restricted where some modification of the biological community is observed, or an occasional violation of water quality standards is found during sampling.

Nonsupport of designated uses is reported for 6 percent (1,090.66 miles) of the assessed miles. When a designated use is limited or not possible based on direct observation (professional judgment), violation of water quality standards, or a severely degraded biological community, a stream is reported as not supporting designated uses.

The primary causes of stream impairment are from metals and nutrients (Table 4). Coal mine drainage is the source for most of the metals degrading stream reaches in the Susquehanna River Basin (Table 5). Sources of nutrients include municipal and domestic waste discharges and surface runoff and ground-water inflow from agricultural areas.

TABLE 4. Susquehanna River Basin Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses by Various Cause Categories

(in miles)

Cause Category	Size of Waters by Contribution to Impairment			
	Not Fully Supporting		Partially Supporting	
	Major	Minor	Major	Minor
Unknown	28.00	13.40	47.94	6.00
Toxicity	9.50	13.40	2.50	
Pesticides			21.50	
Organics			10.00	
Metals	736.68	26.40	109.30	24.00
Ammonia			0.50	
Chlorine	13.40		3.78	6.00
Other Inorganics				
Nutrients	82.50	10.00	192.05	97.50
pH	150.00		18.60	4.50
Siltation	15.60	12.00	141.05	55.90
DO	98.00	4.00	49.60	
TDS	5.00	35.20		
Thermal Modification	0.10		16.50	
Flow Alteration	32.00			
Habitat Alteration			19.40	21.00
Pathogen Indicators	50.30	2.80	8.00	15.60
Radiation				
Oil and Grease		13.40	5.20	
Odor				
Suspended Solids			1.70	5.20
Noxious Aquatic Plants				
Filling and Draining				
Sulfate			20.00	

TABLE 5. Susquehanna River Basin Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses by Various Source Categories

(in miles)

Source Category	Size of Waters by Contribution to Impairment			
	Not Fully Supporting		Partially Supporting	
	Major	Minor	Major	Minor
Unknown	2.00		42.84	
Domestic Waste	31.60	3.00	5.00	15.60
Industrial Waste	13.70	19.30	58.10	24.00
Municipal Waste	81.70	6.80	56.48	29.40
Other Point Source	2.00	7.50	1.00	1.00
Agricultural Runoff	31.60	10.00	220.60	87.60
Urban Runoff	2.90	6.00	8.90	32.00
Other Nonpoint Source	10.00	6.00	90.00	21.70
Acid Precipitation			6.40	4.50
Acid Mine Drainage	896.76		133.30	
Mining (non-coal)	6.60			
Landfills	1.00	10.00		
Hydro/Habitat Modification				

Section 303(d) Waters

Section 303(d) requires States to identify, establish a priority ranking, and develop total maximum daily loads (TMDLS) for waters that do not achieve or are not expected to achieve water quality standards after the implementation of existing controls. As part of the TMDL process, SRBC has assisted Pa. DER in completing several priority water body surveys. These surveys were contractually funded by Pa. DER's 205(j) grant.

Since the last reporting cycle, PWBSs were conducted on several streams in the lower Susquehanna River Basin. These streams include the West Conewago Creek, East Conewago Creek, Cocalico Creek, and Conestoga River. The results of the surveys were forwarded to Pa. DER, Bureau of Water Quality Management, to fulfill the requirements of section 303(d) and 304(l).

Chapter Three: Rivers and Streams Water Quality Assessment

Chemung Subbasin

The Chemung River Subbasin is located in the northwestern part of the Susquehanna River Basin and drains a watershed of 2,604 square miles (Figure 4). The New York state part of the Subbasin totals 1,880 square miles, with the remaining area in Pennsylvania. The Chemung River is formed by the confluence of the Tioga River, flowing northward from Pennsylvania, and the Cohocton River, flowing southeast in New York. The Chemung joins the Susquehanna River at Sayre, Pennsylvania.

The terrain is typical of glaciated watersheds, rolling to flat-topped uplands with steep sided alluvial valleys in which the main rivers flow. Forests occupy the steeper hillsides bordering stream valleys, while the flatter hilltops and stream valleys are utilized for agriculture. Major mineral resources are the sand and gravel deposits located in the alluvial valleys and coal mining in the headwaters of the Tioga River. Major population centers are the cities of Elmira, Corning, and Hornell.

Designated Use Support

Over 89 percent of the stream miles assessed meet designated uses (Table 6). This represents approximately 1,300 stream miles. Partial support of designated uses is reported for 5 percent (79.50 miles) of the assessed miles. Nonsupport of designated uses is reported for 5 percent (72.42 miles) of the assessed miles.

**TABLE 6. Chemung Subbasin Overall Use Support Summary
for Rivers and Streams**

(in miles)

Degree of Use Support	Assessment Category		Total Assessed
	Evaluated	Monitored	
Size Fully Supporting	965.10	334.38	1,299.48
Size Partially Supporting	0.00	79.50	79.50
Size Not Supporting	0.00	72.42	72.42
TOTAL ASSESSED	965.10	486.30	1,451.40

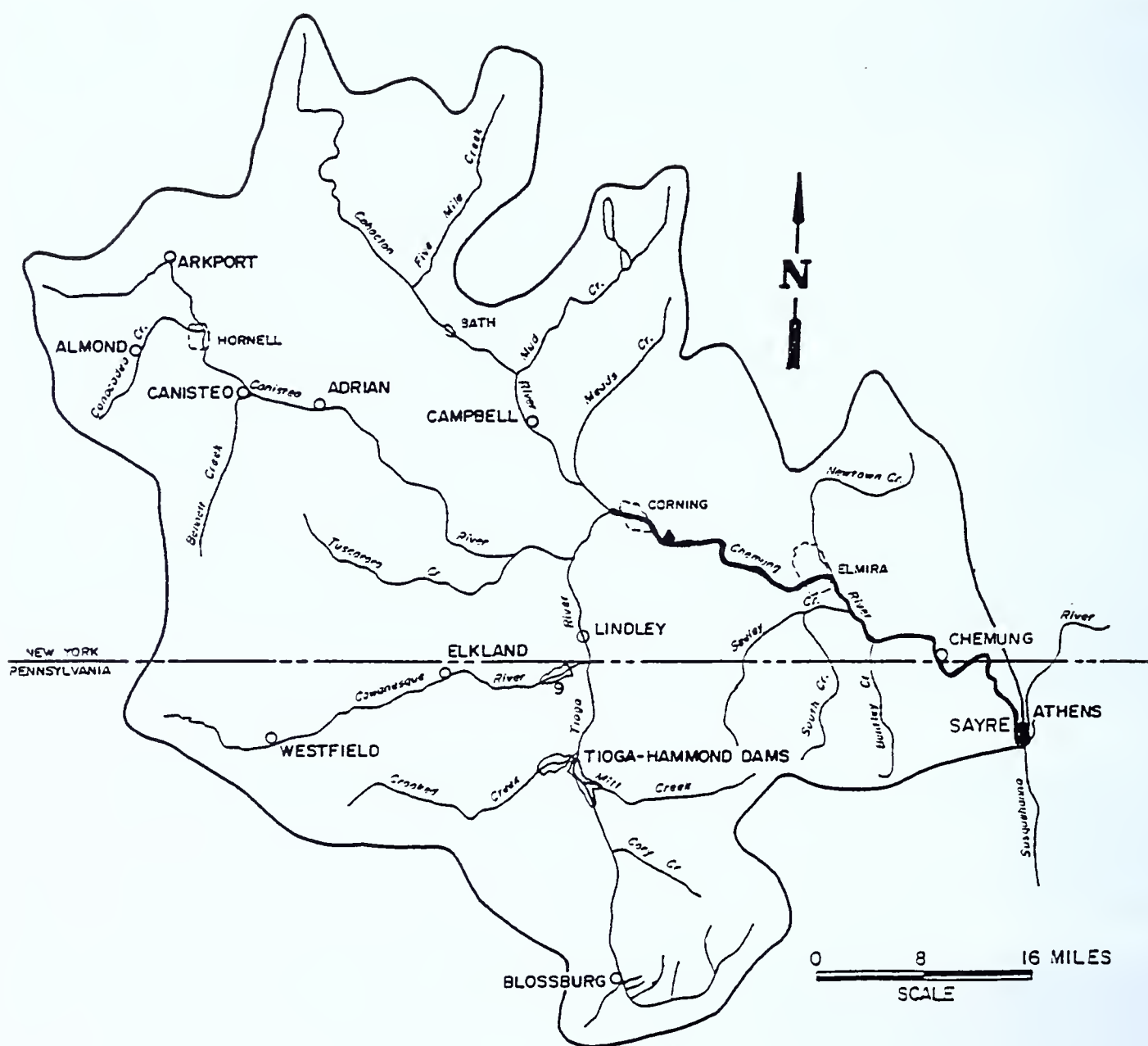


FIGURE 4. Map Showing the Chemung Subbasin

Causes and Sources of Nonsupport of Designated Uses

The primary cause of stream impairment in the Chemung Subbasin is high metal concentrations and low pH associated with coal mine drainage in the Tioga River. Several tributaries located near the headwaters contribute poor quality waters to the Tioga River. In the vicinity of Blossburg, Morris Run is the largest source of acid mine drainage with Coal Creek, Bear Run, and Johnson Creek also contributing poor quality water to the Tioga River. Water quality improves in the lower reach of the Tioga River at the Tioga-Hammond dams. Since 1989, annual rapid bioassessments of the Tioga River at Lindley have shown improving biological conditions ranging from moderately impaired to slightly impaired (Bollinger, 1993).

Nutrient enrichment of streams in the Chemung Subbasin occurs on several tributaries to the Chemung River and along the main stem of the Chemung River. Problems are apparent downstream from known municipal waste discharges and also from non-point agricultural sources.

During the 1992 fiscal year (July 1991 - June 1992), SRBC monitored interstate streams on the Chemung River at Chemung, New York, and seven interstate tributaries -- North Fork Cowanesque River, Cowanesque River, Troups Creek, Tioga River, Seeley Creek, South Creek, and Bently Creek. Biological conditions in the North Fork Cowanesque River and Troups Creek were nonimpaired, while the remaining streams indicated slight to moderate impairment of the biological community. Bollinger (1993) reports that the Chemung River is affected by wastewater discharges from the city of Elmira, New York, which contribute to a slightly impaired biological community and elevated nutrient and metals concentrations. Total and dissolved iron exceeded New York guidelines at South Creek in July 1991.

The causes and sources of nonsupport are shown in Tables 7 and 8, respectively.

TABLE 7. Chemung Subbasin Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses by Various Cause Categories

(in miles)

Cause Category	Size of Waters by Contribution to Impairment			
	Not Fully Supporting		Partially Supporting	
	Major	Minor	Major	Minor
Unknown	7.00		16.30	
Toxicity	7.00			
Pesticides				
Organics				
Metals	26.12	7.50	20.00	
Ammonia				
Chlorine				
Other Inorganics				
Nutrients	10.80		9.10	1.30
pH	40.52		9.80	
Siltation	0.60	11.10	12.00	7.80
DO	6.00	1.30		
TDS				
Thermal Modification				
Flow Alteration	6.00			
Habitat Alteration				
Pathogen Indicators	9.50	2.80	8.00	5.60
Radiation				
Oil and Grease		5.20		
Odor				
Suspended Solids				5.20
Noxious Aquatic Plants				
Filling and Draining				
Sulfate		20.00		

TABLE 8. Chemung Subbasin Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses by Various Source Categories

(in miles)

Source Category	Size of Waters by Contribution to Impairment			
	Not Fully Supporting		Partially Supporting	
	Major	Minor	Major	Minor
Unknown	1.00		16.30	
Domestic Waste				5.60
Industrial Waste				
Municipal Waste	16.30	2.80	8.00	
Other Point Source	2.00	7.50		
Agricultural Runoff	6.00		9.10	7.80
Urban Runoff		6.00		
Other Nonpoint Source		6.00	16.30	6.50
Acid Precipitation			5.90	
Acid Mine Drainage	40.52		23.90	
Mining (non-coal)	6.60			
Landfills				
Hydro/Habitat Modification				

Eastern Subbasin

The Eastern Subbasin is located in the northeastern part of the Susquehanna River Basin and drains a watershed of 4,944 square miles, of which 4,520 square miles reside in New York State (Figure 5). The source of the Susquehanna River is Otsego Lake at Cooperstown, New York, where it flows southward across Pennsylvania and back into New York at Great Bend, Pennsylvania. The Susquehanna River then flows westward to be joined by the Chemung River at Sayre, Pennsylvania.

Most of the land is steeply sloped from hills and high ridges; thus, forests are the dominant land use. Level areas are generally in agriculture. The rural population is dispersed throughout the subbasin in the form of small villages. Major population centers are the cities of Binghamton, Johnson City, Endicott, Cortland, and Oneonta.

Designated Use Support

Over 90 percent of the assessed stream miles meet designated uses (Table 9). This represents 2,485.35 miles of assessed streams. Partial support of designated uses is reported for 7 percent (183.70 miles) of the assessed miles. Nonsupport of designated uses is reported for 3 percent (75.30 miles) of the assessed miles.

**TABLE 9. Eastern Subbasin Overall Use Support Summary
for Rivers and Streams**

(in miles)

Degree of Use Support	Assessment Category		Total Assessed
	Evaluated	Monitored	
Size Fully Supporting	1,634.81	850.54	2,485.35
Size Partially Supporting	0.00	183.70	183.70
Size Not Supporting	0.00	75.30	75.30
TOTAL ASSESSED	1,634.81	1,109.54	2,744.35

Causes and Sources of Nonsupport of Designated Uses

Several stream reaches in the Eastern Subbasin are experiencing nutrient enrichment and siltation. The combination of steep tributary gradients and glacial deposits provides excellent conditions for erosion. The areas that coincide with agricultural land uses introduce nutrients, as well as sediment, to streams in the subbasin. Eutrophic conditions and increased siltation of the streambed have reduced habitat necessary for fish propagation, thus stressing fish survival.

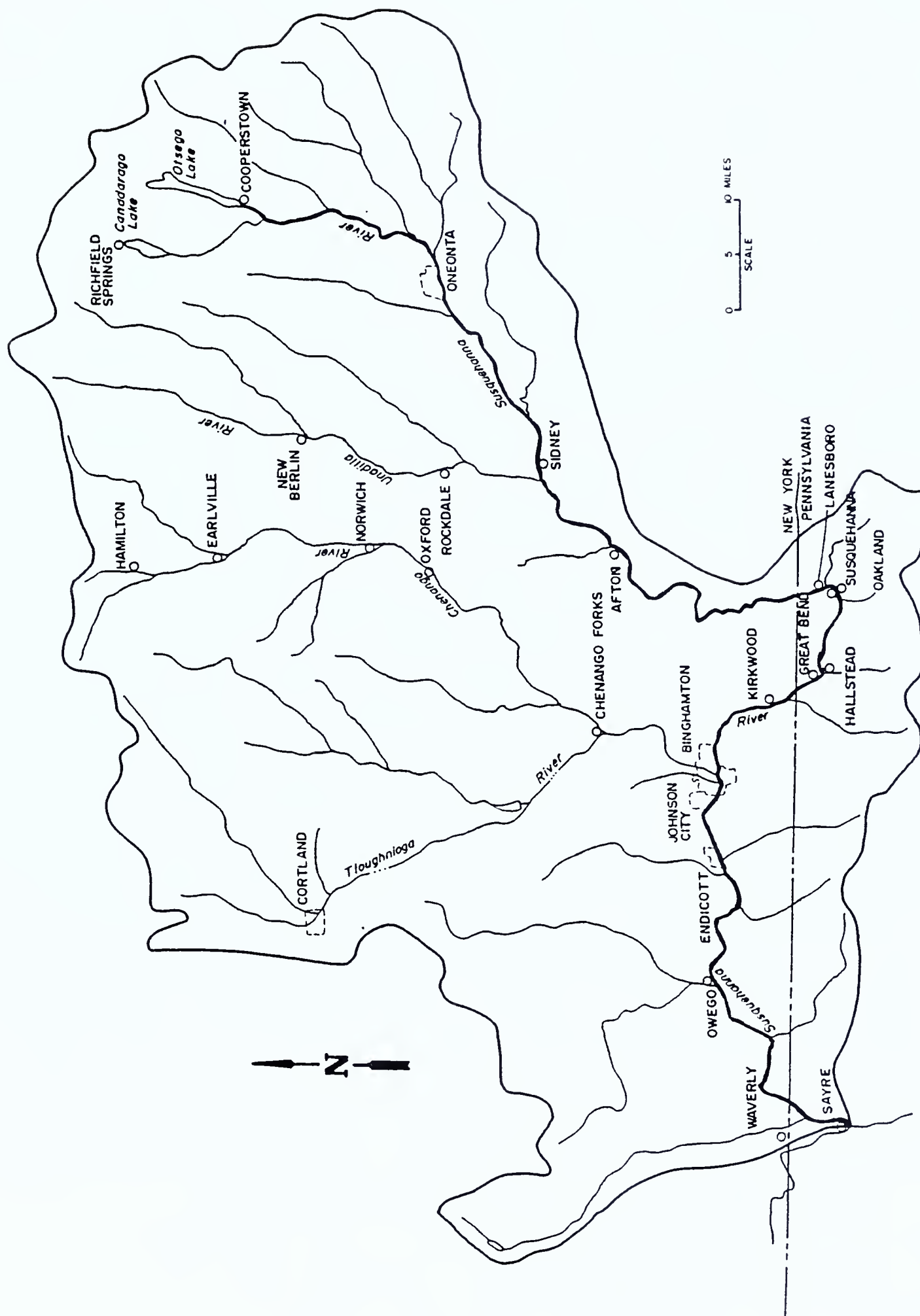


FIGURE 5. Map Showing the Eastern Subbasin

Other sources of nutrients include discharges from municipal waste systems, especially along the larger streams and rivers. Raw sewage and pathogens from combined sewer overflows and failing on-site systems have been reported along some tributaries and reaches on the Susquehanna River, the Chenango River, the Tioughnioga River, and the Unadilla River.

Between July 1, 1991, and June 30, 1992, SRBC monitored interstate streams in the Eastern Subbasin including the Susquehanna River at Windsor and Kirkwood, New York, and Sayre, Pennsylvania. The seven interstate tributaries sampled include Trowbridge Creek, Snake Creek, Little Snake Creek, Choconut Creek, Apalachin Creek, Wappasening Creek, and Cayuta Creek. Three streams showed a slight impairment to the biological community (Cayuta Creek, Little Snake Creek and Trowbridge Creek); remaining stream locations did not show any impairment. The parameter that frequently exceeded water quality standards was total iron, which exceeded New York guidelines at least once at six locations. Although not exceeding any standards, nutrient concentrations (nitrogen and phosphorus species) were higher on Cayuta Creek, compared to the other interstate stream locations. Elevated nutrient concentrations and a slightly impaired biological community on Cayuta Creek indicate that wastewater discharges from the Waverly sewage treatment facility upstream from the sampling site may be affecting stream health (Bollinger, 1993).

The causes and sources of nonsupport are shown in Tables 10 and 11, respectively.

TABLE 10. Eastern Subbasin Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses by Various Cause Categories

(in miles)

Cause Category	Size of Waters by Contribution to Impairment			
	Not Fully Supporting		Partially Supporting	
	Major	Minor	Major	Minor
Unknown		13.40	1.70	
Toxicity		13.40		
Pesticides				
Organics				
Metals	1.00		1.00	
Ammonia				
Chlorine	13.40		1.70	
Other Inorganics				
Nutrients	33.40	10.0	41.00	80.20
pH				
Siltation	10.00		105.60	36.10
DO	54.20			
TDS				
Thermal Modification	0.10		16.50	
Flow Alteration				
Habitat Alteration			16.50	1.00
Pathogen Indicators	30.80			
Radiation				
Oil and Grease		13.40		
Odor				
Suspended Solids			1.70	
Noxious Aquatic Plants				
Filling and Draining				
Sulfate				

TABLE 11. Eastern Subbasin Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses by Various Source Categories

(in miles)

Source Category	Size of Waters by Contribution to Impairment			
	Not Fully Supporting		Partially Supporting	
	Major	Minor	Major	Minor
Unknown			1.70	
Domestic Waste	28.60		1.00	
Industrial Waste	0.10	13.40		
Municipal Waste	35.60		9.70	17.40
Other Point Source			1.00	1.00
Agricultural Runoff		10.00	90.60	83.80
Urban Runoff			4.00	12.00
Other Nonpoint Source	10.00		73.70	15.20
Acid Precipitation				
Acid Mine Drainage				
Mining (non-coal)				
Landfills	1.00	10.00		
Hydro/Habitat Modification				

Upper Susquehanna Subbasin

The Upper Susquehanna River Subbasin comprises a 3,755-square-mile watershed, located in northeastern Pennsylvania (Figure 6). The river flows southeast through high, flat-topped plateaus, separated by steep-sided valleys. Midway, the Susquehanna River joins the Lackawanna River before turning and flowing southwest towards Sunbury, Pennsylvania. The terrain in the southern part of the subbasin consists of northeast-southwest trending ridges and valleys.

The major population center in the subbasin is in what is known as the Wyoming Valley. This valley extends from Carbondale in the north and southwest along the Lackawanna River and Susquehanna River to Nanticoke in the south. This highly urbanized former coal mining region is dominated by the cities of Scranton and Wilkes-Barre.

Designated Use Support

Over 90 percent of the stream miles assessed meet designated uses (Table 12). This represents 2,302.26 stream miles. Partial support of designated uses is reported for 3 percent (75.40 miles) of the assessed miles. Nonsupport of designated uses is reported for 6 percent (158.50 miles) of the assessed miles.

TABLE 12. Upper Susquehanna Subbasin Overall Use Support Summary for Rivers and Streams

(in miles)

Degree of Use Support	Assessment Category		Total Assessed
	Evaluated	Monitored	
Size Fully Supporting	1,539.70	765.56	2,305.26
Size Partially Supporting	5.20	70.20	75.40
Size Not Supporting	28.80	129.70	158.50
TOTAL ASSESSED	1,573.70	965.46	2,539.16

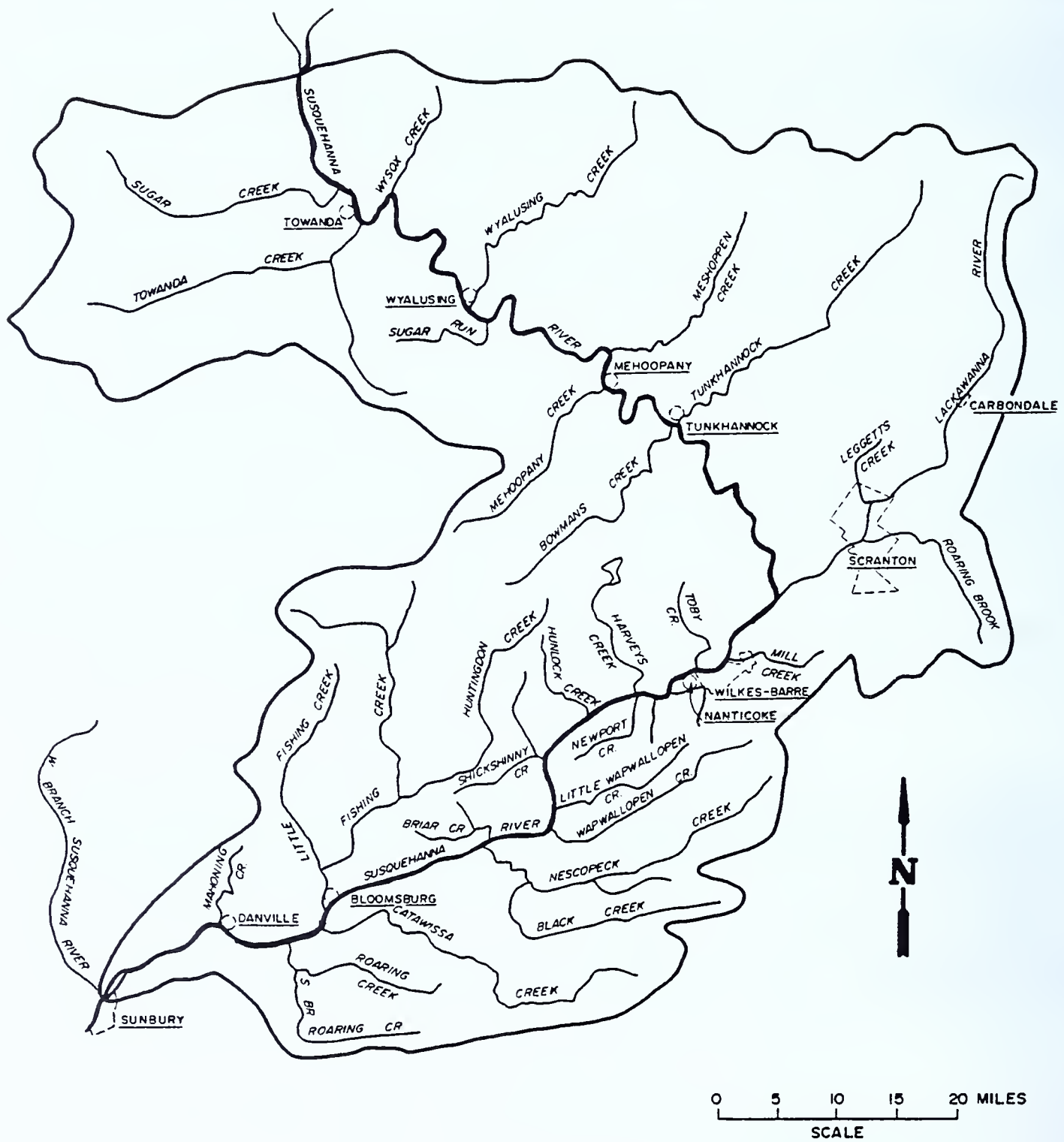


Figure 6. Map Showing Upper Susquehanna Subbasin

Causes and Sources of Nonsupport of Designated Uses

The Upper Susquehanna Subbasin can be divided into two areas based on water quality. They are the area upstream (north) of the confluence of the Lackawanna River and the Susquehanna River, and the remaining area downstream (south).

With the exception of a few impaired reaches, the northern part of the subbasin has very good water quality and supports a healthy biological community. Most of the tributaries in this part of the subbasin flow through agricultural and forest lands. The reaches that are impaired vary from the effects of agricultural, domestic, municipal, and industrial sources. Malione and others (1984) reported that a few points of localized degradation along the Susquehanna River are quickly assimilated and that good conditions prevail downstream to the mouth of the Lackawanna River.

In the southern part of the subbasin, many stream reaches are degraded by the effects of acid mine drainage from a once prevalent coal mining industry. Many of the impaired tributaries, including the Lackawanna River, are located in the Wyoming Valley. The most obvious impact on water quality is evident immediately downstream from the Lackawanna River where a red-orange precipitate coats the Susquehanna River channel along the east bank for several miles (Malione, and others, 1984). The impact of this major urban population center on the tributaries is evident by storm water runoff and sewage in the streams along with trash and debris in the streambeds.

Downstream from the Wyoming Valley, the water quality of the Susquehanna River improves. Most of tributaries along this reach are characteristic of the streams in the northern part of the subbasin, contributing good quality water. The major source of degradation is impairment from coal mine drainage primarily on Catawissa Creek, Black Creek, and Nescopeck Creek.

The causes and sources of nonsupport are shown in Tables 13 and 14, respectively.

TABLE 13. Upper Susquehanna Subbasin Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses by Various Cause Categories

(in miles)

Cause Category	Size of Waters by Contribution to Impairment			
	Not Fully Supporting		Partially Supporting	
	Major	Minor	Major	Minor
Unknown	13.50		0.50	
Toxicity			0.50	
Pesticides				
Organics				
Metals	9.00		26.00	
Ammonia			0.50	
Chlorine				
Other Inorganics				
Nutrients			9.00	
pH	109.00		3.30	
Siltation				
DO			11.80	
TDS	1.00		1.40	
Thermal Modification				
Flow Alteration	26.00			
Habitat Alteration			2.90	20.00
Pathogen Indicators				
Radiation				
Oil and Grease				
Odor				
Suspended Solids				
Noxious Aquatic Plants				
Filling and Draining				
Sulfate				

Table 14. Upper Susquehanna Subbasin Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses by Various Source Categories

(in miles)

Source Category	Size of Waters by Contribution to Impairment			
	Not Fully Supporting		Partially Supporting	
	Major	Minor	Major	Minor
Unknown	1.00		1.40	
Domestic Waste			4.00	
Industrial Waste			1.00	
Municipal Waste			7.80	
Other Point Source				
Agricultural Runoff			9.00	
Urban Runoff			2.90	20.00
Other Nonpoint Source				
Acid Precipitation				
Acid Mine Drainage	157.50		29.30	
Mining (non-coal)				
Landfills				
Hydro/Habitat Modification				

West Branch Susquehanna Subbasin

The West Branch Susquehanna River drains 6,992 square miles of the western and central part of the Susquehanna River Basin (Figure 7). Originating in the low rolling hills of the Allegheny Mountains, the West Branch flows northeast passing the steep hillsides of the Allegheny High Plateaus Section. At Renovo, the West Branch turns southeast and cuts through the Allegheny Front, entering a region of broad valleys, separated by long, high ridges. Following the northern flank of Bald Eagle Mountain northeastward, the West Branch turns south to its confluence with the Susquehanna River near Sunbury.

Land cover is predominately forests, especially in the northern and western ends of the subbasin where land is less suitable for agriculture. Extensive coal mining is the major land use activity in the western parts of the subbasin. Agricultural and urban lands are primarily located in the eastern and southern parts of the subbasin. Large communities include State College, Lock Haven, Williamsport, Clearfield, and Lewisburg.

Designated Use Support

Over 88 percent of the stream miles assessed meet designated uses (Table 15). This represents 4,378.15 stream miles. Partial support of designated uses is reported for 2 percent (95.80 miles) of the assessed miles. Nonsupport of designated uses is reported for 10 percent (482.94 miles) of the assessed miles.

**TABLE 15. West Branch Susquehanna Subbasin Overall Use Support Summary
for Rivers and Streams**

(in miles)

Degree of Use Support	Assessment Category		Total Assessed
	Evaluated	Monitored	
Size Fully Supporting	3,760.73	617.42	4,378.15
Size Partially Supporting	2.80	93.00	95.80
Size Not Supporting	65.18	417.76	482.94
TOTAL ASSESSED	3,828.71	1,128.18	4,956.89

Causes and Sources of Nonsupport of Designated Uses

Past coal mining activities and its associated acid mine drainage is the most important factor affecting the water quality of the West Branch Susquehanna River and its tributaries. Low pH and elevated concentrations of heavy metals are responsible for the absence of aquatic life in many streams of the subbasin.

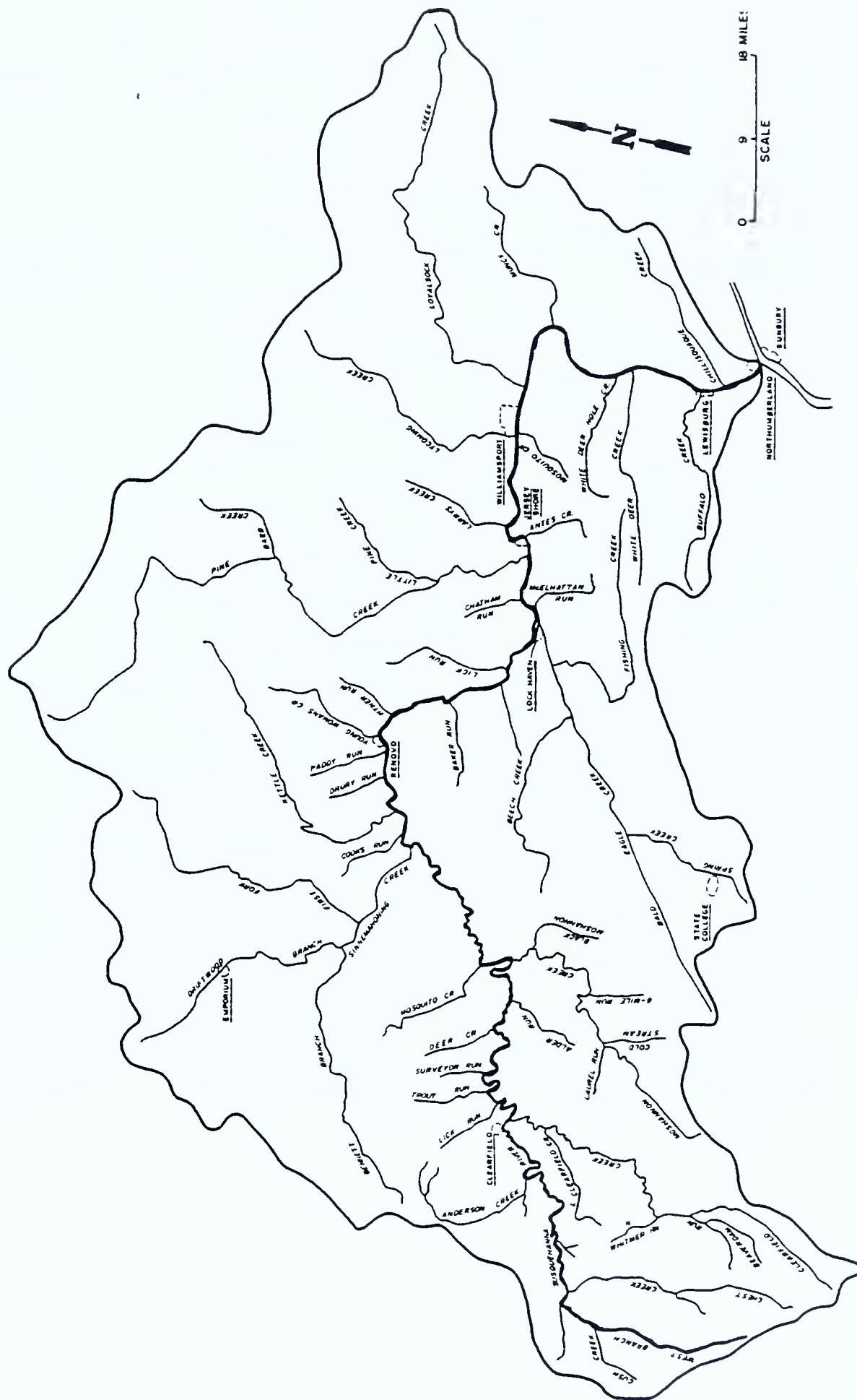


FIGURE 7. Map Showing the West Branch Susquehanna Subbasin

Nearly 200 miles of the West Branch Susquehanna River are impaired to various degrees by acid mine drainage. The headwaters downstream to the mouth of Chest Creek represents the upper 50 miles of the West Branch. Parts of this reach are characterized as severely degraded with the absence of biological communities and high concentrations of aluminum, sulfate, and dissolved solids. However, waters are naturally alkaline in the upper subbasin and improve conditions to where biological communities exist but are stressed.

Stream conditions change from Chest Creek downstream to Clearfield (approximately 37 miles). This reach has the best water quality and biological conditions of the first 200 miles of the West Branch. Much of the improvement is due to good quality water from Chest Creek and other nonimpaired tributaries. McMorran (1985) reported collecting brown trout, a pollution intolerant species at Bowers, Pennsylvania, indicating good water quality. He also reported that this reach has improved dramatically since the 1960s, when conditions were degraded and aquatic life was severely reduced or absent. He attributes this improvement to the reclamation of abandoned coal mines, which are the major sources of pollutants affecting this reach.

The 104 mile reach from Clearfield to Bald Eagle Creek is the most impaired reach of the West Branch. A significant part of the river is impaired to a point where no aquatic life exists and dissolved solids, acidity, manganese, and sulfate concentrations are high. The stream is very clear, and the substrate is bright orange.

The last 67 miles of the West Branch change remarkably from Bald Eagle Creek to the mouth of the West Branch. The contribution of the alkaline waters of Bald Eagle Creek neutralizes the acidity of the West Branch. At Jersey Shore, the biological community begins its return and water quality improves downstream. The contribution of good to excellent quality waters from other tributaries results in a river extremely improved from the effects of acid mine drainage.

The causes and sources of nonsupport are shown in Tables 16 and 17, respectively.

TABLE 16. West Branch Susquehanna Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses by Various Cause Categories

(in miles)

Cause Category	Size of Waters by Contribution to Impairment			
	Not Fully Supporting		Partially Supporting	
	Major	Minor	Major	Minor
Unknown			2.00	
Toxicity				
Pesticides			21.50	
Organics				
Metals	474.96		62.30	
Ammonia				
Chlorine				
Other Inorganics				
Nutrients				
pH	0.48		5.50	4.50
Siltation				
DO	6.10			
TDS				
Thermal Modification				
Flow Alteration				
Habitat Alteration				
Pathogen Indicators				
Radiation				
Oil and Grease				
Odor				
Suspended Solids				
Noxious Aquatic Plants				
Filling and Draining				
Sulfate				

**TABLE 17. West Branch Susquehanna Subbasin Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses
by Various Source Categories**

(in miles)

Source Category	Size of Waters by Contribution to Impairment			
	Not Fully Supporting		Partially Supporting	
	Major	Minor	Major	Minor
Unknown			2.00	
Domestic Waste				
Industrial Waste			21.50	
Municipal Waste	6.10			
Other Point Source				
Agricultural Runoff				
Urban Runoff				
Other Nonpoint Source				
Acid Precipitation			0.50	4.50
Acid Mine Drainage	475.44		67.30	
Mining (non-coal)				
Landfills				
Hydro/Habitat Modification				

Juniata Subbasin

The Juniata River drains an area of 3,406 square miles in south-central Pennsylvania and is the second largest tributary to the Susquehanna River (Figure 8). The Juniata River is formed by the confluence of the Little Juniata River and the Frankstown Branch Juniata River. The Juniata Subbasin is entirely within the Valley and Ridge Province, which is characterized by a series of tightly folded parallel mountains and long, narrow valleys. Major streams run through the center of valleys, picking up flow from small tributaries from the flanks of mountains.

Farming, the predominate economic activity, is scattered throughout the valleys, while the steep mountain ridges are exclusively forested. The subbasin population is largely rural with the only sizable urban area being Altoona-Hollidaysburg. Other small towns include Tyrone, Huntingdon, Lewistown, and Newport.

Designated Use Support

Over 96 percent of the stream miles assessed meet designated uses (Table 18). This represents 2,177.88 stream miles. Partial support of designated uses is reported for 1.5 percent (33.90 miles) of the assessed miles. Nonsupport of designated uses is reported for 2 percent (43.20 miles) of the assessed miles.

TABLE 18. Juniata Subbasin Overall Use Support Summary for Rivers and Streams

(in miles)

Degree of Use Support	Assessment Category		Total Assessed
	Evaluated	Monitored	
Size Fully Supporting	1,272.97	904.91	2,177.88
Size Partially Supporting	1.30	32.60	33.90
Size Not Supporting	0.00	43.20	43.20
TOTAL ASSESSED	1,274.27	980.71	2,254.98

Causes and Sources of Nonsupport of Designated Uses

The Juniata River supports healthy biological communities and has good quality water throughout its length. Likewise, most of the streams in the Juniata Subbasin have good to excellent water quality. However, water pollution problems do occur on a few stream reaches due to municipal and industrial sources. The Frankstown Branch Juniata River suffers degradation from paper mill discharges. The lower reach of Kishacoquillas Creek, as well as the Beaverdam Branch Juniata River, show impairment from discharges of

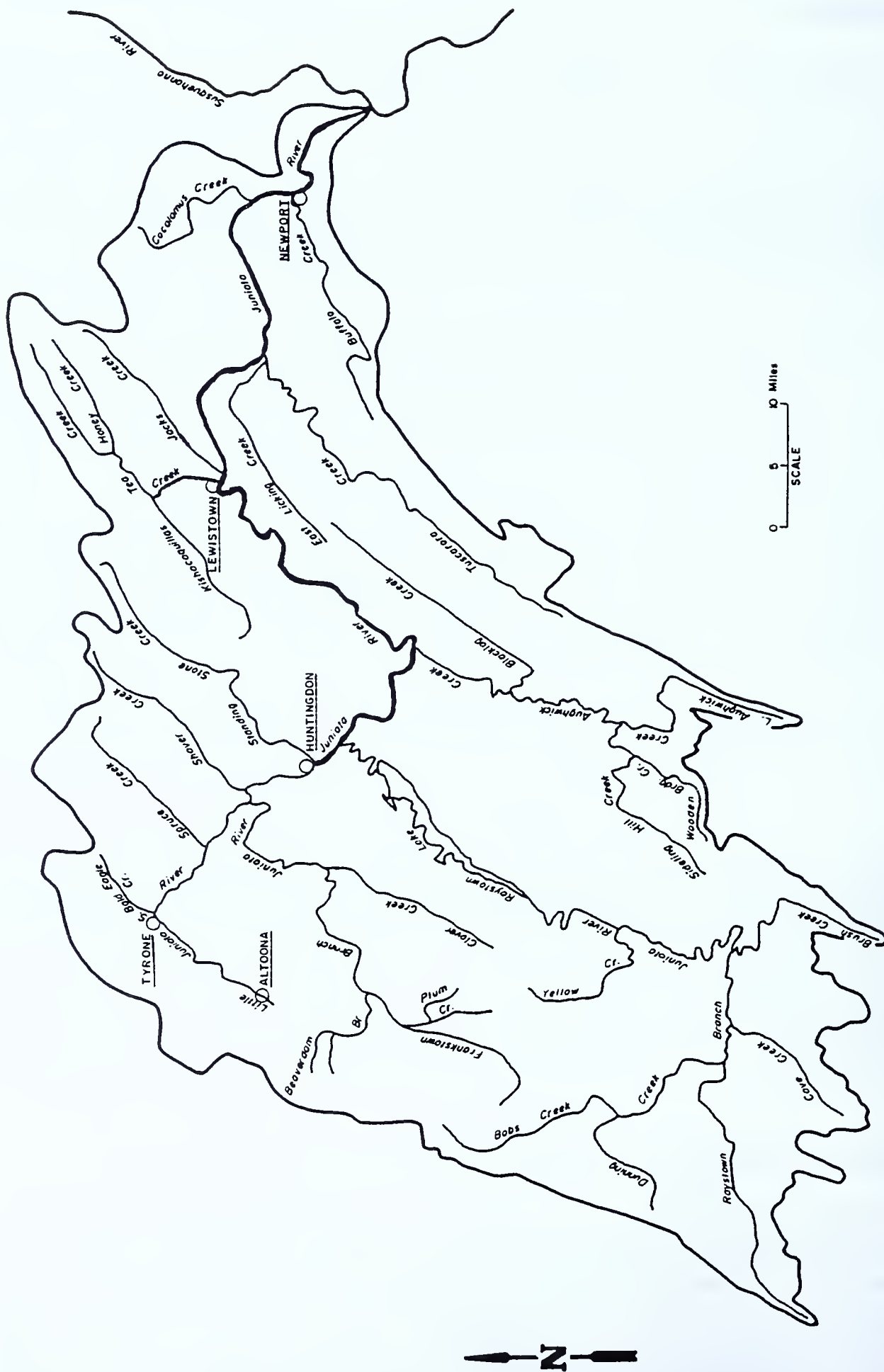


FIGURE 8. Map Showing the Juniata Subbasin

industrial and municipal sources, but improved conditions are expected due to upgrades in municipal systems.

Other problems include agricultural pollution in the upper part of the subbasin. The Soil Conservation Service and Pennsylvania Department of Environmental Resources have indicated that agricultural sources have caused problems on Cove Creek, Clover Creek, and Yellow Creek. A survey of the Juniata Subbasin is being planned by the Susquehanna River Basin Commission in 1997 and includes sampling the streams just mentioned.

The causes and sources of nonsupport are shown in Tables 19 and 20, respectively.

TABLE 19. Juniata Subbasin Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses by Various Cause Categories

(in miles)

Cause Category	Size of Waters by Contribution to Impairment			
	Not Fully Supporting		Partially Supporting	
	Major	Minor	Major	Minor
Unknown	7.50		6.00	6.00
Toxicity	2.50		2.00	
Pesticides				
Organics				
Metals	10.70			
Ammonia				
Chlorine				6.00
Other Inorganics				
Nutrients				
pH				
Siltation	5.00			
DO	18.70	1.30	15.90	
TDS				
Thermal Modification				
Flow Alteration				
Habitat Alteration				
Pathogen Indicators				
Radiation				
Oil and Grease				
Odor				
Suspended Solids				
Noxious Aquatic Plants				
Filling and Draining				
Sulfate				

TABLE 20. Juniata Subbasin Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses by Various Source Categories

(in miles)

Source Category	Size of Waters by Contribution to Impairment			
	Not Fully Supporting		Partially Supporting	
	Major	Minor	Major	Minor
Unknown				
Domestic Waste				
Industrial Waste	8.70		14.60	
Municipal Waste	18.90	1.30	7.30	12.00
Other Point Source				
Agricultural Runoff	5.00			
Urban Runoff				
Other Nonpoint Source				
Acid Precipitation				
Acid Mine Drainage	9.30			
Mining (non-coal)				
Landfills				
Hydro/Habitat Modification				

Lower Susquehanna Subbasin

The Lower Susquehanna River Subbasin comprises a 5,809-square-mile watershed, of which 5,534 square miles are located in south-central Pennsylvania and 275 square miles are located in northern Maryland (Figure 9). The northern part of the subbasin contains ridges trending southwest to northeast and parallel valleys of moderate width. The Susquehanna River cuts through these series of ridges and valleys and widens as it flows south to southeast through rolling hills and broad valleys of the central part of the subbasin. The southern part of the subbasin is characterized by metamorphosed rocks that have been intensely folded and faulted. These rocks caused the river to carve a deep gorge into the bedrock in a narrowing river valley. Finally, the river makes its way to Harve de Grace, Maryland, and the mouth of the Susquehanna River. Here, 444 miles from Otsego Lake, the Susquehanna River flows into the Chesapeake Bay, for which it provides over 50 percent of the freshwater inflow.

Of the six subbasins in the Susquehanna River Basin, the Lower Susquehanna Subbasin is the most developed. The steep river slope and narrow valley of the Lower Susquehanna gorge provide an ideal setting for electric generation (McMorran, 1986). The most productive agricultural lands and largest population centers are located in this subbasin. Intense agricultural development occurs in the many fertile soils throughout the subbasin. A significant population is employed in government related activities around Harrisburg, the state capital. Other major population and industrial centers are Lancaster, York, Lebanon and Carlisle.

Designated Use Support

Over 87 percent of the assessed stream miles meet designated uses (Table 21). This represents 3,063.4 miles of assessed streams. Partial support of designated uses is reported for 5.5 percent (195.07 miles) of the assessed miles. Nonsupport of designated uses is reported for 7 percent (258.3 miles) of the assessed miles.

TABLE 21. Lower Susquehanna Subbasin Overall Use Support Summary for Rivers and Streams

(in miles)

Degree of Use Support	Assessment Category		Total Assessed
	Evaluated	Monitored	
Size Fully Supporting	1,533.15	1,530.25	3,063.40
Size Partially Supporting	13.45	181.62	195.07
Size Not Supporting	22.90	235.40	258.30
TOTAL ASSESSED	1,569.50	1,947.27	3,516.77

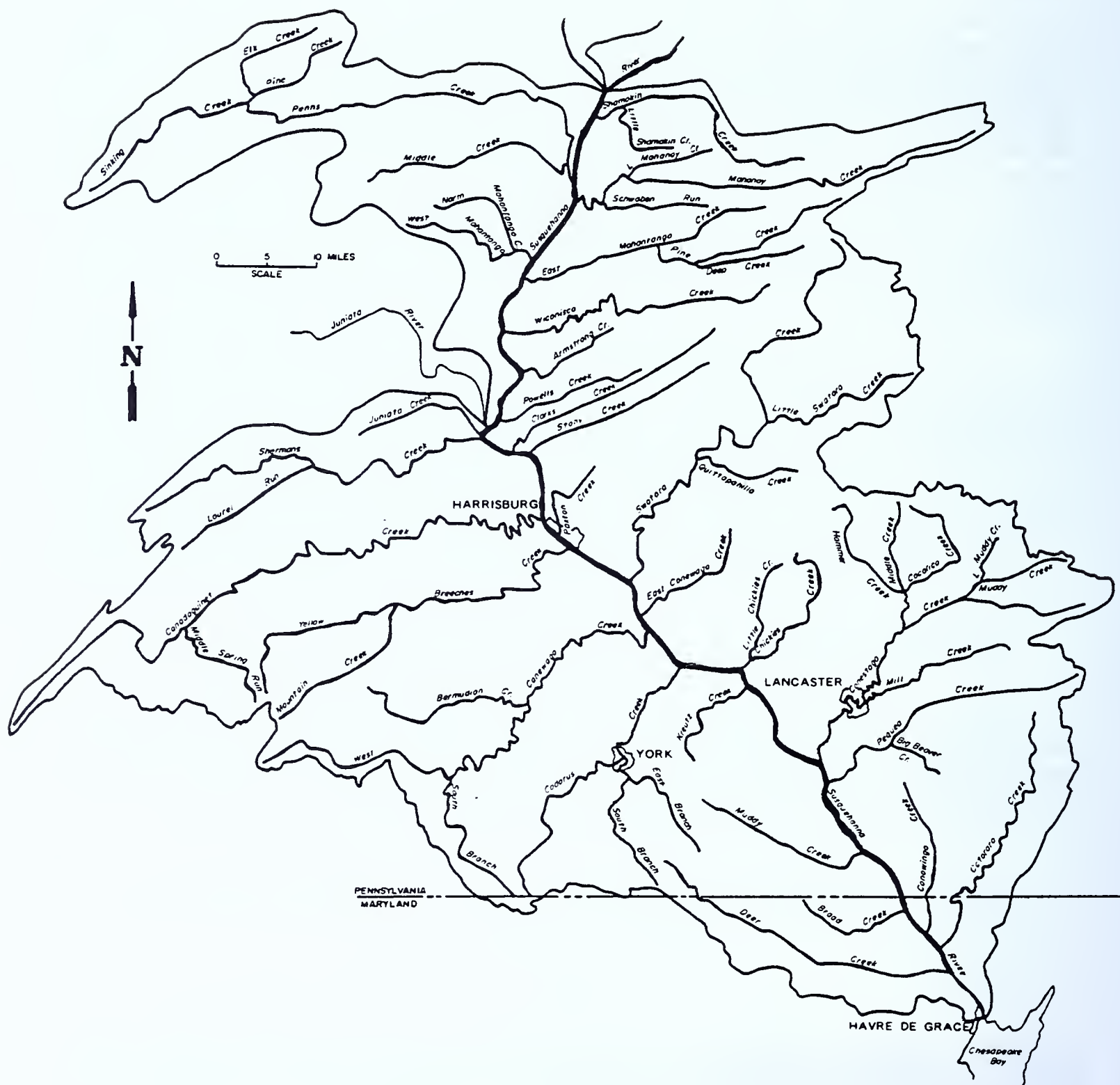


FIGURE 9. Map Showing the Lower Susquehanna Basin

Causes and Sources of Nonsupport of Designated Uses

In the Lower Susquehanna River Subbasin, acid mine drainage and agricultural sources are responsible for the majority of impaired stream reaches, accounting for 29 percent and 50 percent of the impaired reaches, respectively.

The acid-mine-drainage-impaired streams are primarily located in the northern part of the subbasin. These streams are characterized by low pH and high dissolved metals concentrations that severely reduce the aquatic life. Shamokin Creek and Mahanoy Creek are severely impaired from source to mouth. Tributary streams in the upper Swatara Creek are also impaired by acid mine drainage; however, the Swatara Creek recovers as it flows downstream, receiving good quality water from tributaries along the lower reach.

Agricultural sources are responsible for the majority of the impaired reaches in the southern part of the subbasin. Some of the most highly productive agricultural lands in the Susquehanna River Basin are located here. Increased levels of nutrients, siltation, and turbidity are common problems due to agricultural runoff and livestock in streams. These are problems of interest to the Chesapeake Bay Program's efforts to reduce the transport of sediment and nutrients to the Chesapeake Bay.

The causes and sources of nonsupport are shown in Tables 22 and 23, respectively.

TABLE 22. Lower Susquehanna Subbasin Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses by Various Cause Categories

(in miles)

Cause Category	Size of Waters by Contribution to Impairment			
	Not Fully Supporting		Partially Supporting	
	Major	Minor	Major	Minor
Unknown			21.40	
Toxicity				
Pesticides				
Organics				
Metals	214.90	8.90		24.00
Ammonia				
Chlorine			2.08	
Other Inorganics				
Nutrients	28.30		116.95	
pH				
Siltation			5.95	
DO	2.50	2.70	12.60	
TDS	4.00		33.80	
Thermal Modification				
Flow Alteration				
Habitat Alteration				
Pathogen Indicators				10.00
Radiation				
Oil and Grease				
Odor				
Suspended Solids				
Noxious Aquatic Plants				
Filling and Draining				
Sulfate				

Table 23. Lower Susquehanna Subbasin Total Sizes of Waters Not Fully Supporting and Partially Supporting Uses by Various Source Categories

(in miles)

Source Category	Size of Waters by Contribution to Impairment			
	Not Fully Supporting		Partially Supporting	
	Major	Minor	Major	Minor
Unknown			21.44	
Domestic Waste	3.00	3.00		10.00
Industrial Waste	4.90	5.90	21.00	24.00
Municipal Waste	4.30	2.70	23.68	
Other Point Source				
Agricultural Runoff	20.60		111.90	
Urban Runoff	2.90		2.00	
Other Nonpoint Source				
Acid Precipitation				
Acid Mine Drainage	214.00		12.80	
Mining (non-coal)				
Landfills				
Hydro/Habitat Modification				

Chapter Four: Lake Water Quality Assessment

During past 305(b) reporting cycles, SRBC had not conducted any lake or reservoir assessments in the basin. However, a two-year project, funded by EPA and Pa. DER through the Section 314(a) Clean Lakes Program, will begin in 1994. The project will: (1) update the Pa. DER's database for lakes and water quality of lakes; (2) enhance the water quality assessment reporting activities under Section 305(b); and (3) help evaluate and prioritize projects funded under the Section 314 Clean Lakes Program. This project will also provide a foundation upon which the SRBC can begin its lake assessment program within the Susquehanna River basin.

The Phase I activities include all tasks required to assemble lake data, characterize lake watersheds, and determine/verify lake accessibility to the public. It is anticipated that about 150 lakes will be assessed and visited. Phase II will include completion of the first year's tasks, increasing the number of lakes assessed to over 200, and initiate field collection of water quality data for the ten lakes in the Susquehanna River Basin reported on by Pa. DER in 1981. A draft report describing the sources of data and the data gathering procedures will be completed.

Chapter Five: Estuary and Coastal Assessment

Not applicable.

Chapter Six: Wetlands Assessment

SRBC has not conducted any assessment work on wetlands in the basin.

Chapter Seven: Public Health/Aquatic Life Concerns

Toxics in the nation's waters and its impacts on human and aquatic health have been of increasing concern to federal and state agencies. These pollutants enter the water environment from point sources such as industrial facilities and sewage treatment plants, nonpoint sources such as agricultural and urban runoff, atmospheric deposition, and weathering and erosion of rock and soil.

The Susquehanna River Basin Commission's role in addressing toxic pollution is to support state and federal programs. The Commission assists other agencies in data collection for the overall goals of the Chesapeake Bay Program and Pa. DER's PWBSs. None of the SRBC programs are directed specifically at toxic substances in lakes or freshwater wetlands.

In May 1991, a river station was established on the main stem Susquehanna River at Marietta, Pa., to monitor the transport of metals and pesticides from the Susquehanna River Basin. In October 1991, additional stations on the Conestoga River at Conestoga, Pa., and Paxton Creek near Penbrook, Pa., were added to determine toxic runoff from agricultural and urban watersheds, respectively. These projects are funded under the Chesapeake Bay Program in cooperation with the Pa. DER.

The summary of toxics contamination and health protection responses is presented in Table 24.

TABLE 24. Toxic Contamination/Public Health Impacts

Water Body	State	Site	Pollutant	Comment
Susquehanna River	Pa.	Mouth of Lackawanna River to Village of Hunlock Creek	PCB	Consumption Advisory: Shorthead Redhorse and other suckers Quillback Carpsucker Carp - do not eat
Codorus Creek	Pa.	Spring Grove to mouth of South Banch. Codorus Creek	Dioxin	Consumption Advisory: Green Sunfish no more than 2 meals per month
South Branch Codorus Creek	Pa.	York County Water Company Dam to mouth	Dioxin	Consumption Advisory: Green Sunfish - no more than 2 meals per month
Spring Creek	Pa.	Route 3010 at Oak Hall to mouth	Mirex	No-kill zone: catch and release only
Koppers Pond	N.Y.	Town of Horseheads	PCB	Fish Consumption Advisory: Carp

PART IV: GROUND WATER ASSESSMENT

Overview

The Commission obtains ground-water quality information through ground-water withdrawal permits, investigations, cooperative studies, and surveys pertaining to existing ground-water quality or probable future ground-water quality in the basin. One series of reports (Taylor, 1988; Taylor and Werkheiser, 1984; Taylor, 1984; Taylor and others, 1983; Taylor and others, 1982) evaluated the ground-water quantity and quality characteristics of the Susquehanna River Basin through many water quality analyses of wells and springs.

The authors found that the most commonly reported ground-water quality problems in the basin are excessive iron and manganese, hydrogen sulfide, hardness, bacterial organisms from sewage, acid mine drainage, excessive nitrates, petroleum products from buried storage tanks, chlorinated solvents from degreasing operations, and landfill leachate. Most local ground-water problems occur in the shallow aquifer. Good quality ground water may be obtained from the deeper aquifer if wells are constructed with deeper casing and the annular openings are tightly sealed.

In the Chemung and Eastern Subbasins, the most common naturally occurring constituents in excessive amounts are iron, manganese, chloride, sodium, and barium. Analyses from some wells indicated the presence of natural and hydrogen sulfide gas. Contamination from acid mine drainage is a problem in the southern part of the Chemung Subbasin.

The primary aquifers of the two northern subbasins are the stratified drift deposits found in the major valleys. Most of the cultural development is located in these major valleys on top of the primary aquifers; thus, ground water is highly vulnerable to contamination.

In the West Branch Susquehanna River Subbasin, several significant coal-bearing units are located throughout the basin. The natural ground-water quality sampled from some wells exhibited elevated amounts of iron, sulfate, and dissolved solids, which are also the same characteristics of ground water contaminated by acid mine drainage. Because of the similarity in water quality from acid mine drainage contamination and natural conditions, documentation of acid mine polluted ground water is difficult.

The ground-water quality of the Upper Susquehanna Subbasin is similar to many of the other subbasins. The glaciated terrain in the northern part of the subbasin experiences the same water quality as that of the Chemung and Eastern Subbasins. Significant anthracite bearing units and associated mining activities in the Lackawanna River valley have resulted in water quality similar to that of the West Branch Susquehanna Subbasin.

In the Juniata Subbasin, the greatest differences in water quality occur between calcareous and noncalcareous rock units. The highest concentrations of iron were in the noncalcareous units and coal bearing units. The only significant coal-bearing units in the Juniata Subbasin occur in the Broad Top coal field of Bedford, Fulton, and Huntingdon Counties, where land has been disturbed by surface- and deep-mining operations. Of the 164 water samples taken during the study, 13 percent of the water samples showed ground-water quality has been seriously degraded by acid mine water (high iron, manganese, and sulfate; low pH).

Taylor and Werkheiser (1984) analyzed 369 samples obtained from wells and springs to evaluate the ground-water quality of the Lower Susquehanna River Subbasin. The major differences in regional quality occur between rock units that are calcareous, as compared to noncalcareous. Constituents consistently present in greater concentrations in the calcareous units are calcium, dissolved solids, magnesium, and nitrate.

SRBC Ground-Water Program

The primary responsibility for the development or implementation of a ground-water protection strategy resides with the states. SRBC's ground-water program deals with water quantity, as set forth in SRBC's "Regulations and Procedures for Review of Projects," Section 803.62, regulating ground-water withdrawals. Anyone proposing to withdraw ground water in excess of 100,000 gallons per day (gpd), or increase an existing withdrawal to more than 100,000 gpd from a single well or well field, is subject to the Commission's ground-water withdrawal regulations. As part of the regulation, samples of ground water for water quality analysis must be obtained, and results reported to the Commission every three years.

Monitoring of ground water is necessary to insure that ground-water withdrawals and sources of ground-water contamination do not endanger the quantity and quality of the ground-water resource. Ground-water quality contamination from on-lot septic systems and agricultural pollution are concerns of the Susquehanna River Basin Commission, and are identified in the Ground-Water Management Plan (1993).

A large number of domestic wells are located in subdivisions that utilize on-lot septic systems. In the absence of controls on well location and lot size, problems related to well interference and ground-water contamination from the on-lot systems frequently occur.

Agricultural nonpoint source contamination of ground water, principally nitrate and pesticides, has received recent considerable attention. However, limited attention is given to the fact that many of the receiving streams of point sources are influent during parts of the year, and thus are sources of ground-water recharge and potential contamination. The geologic areas of concern are those underlain by carbonate rocks and those having thick deposits of glacial outwash.

PART V: WATER POLLUTION CONTROL PROGRAM

The Susquehanna River Basin Compact assigns primary responsibility for water quality management and control to the signatory states. Therefore, SRBC provides a regional perspective in attempting to coordinate local, state, and federal water quality management efforts, promote uniform enforcement of and compliance with established standards and classifications, and encourage amendment and modification of standards and classifications within the basin, as deemed necessary in the public interest.

SRBC's program objective is to control water pollution sufficiently to maintain and establish water quality capable of supporting multiple purpose uses for: public water supply after treatment; recreation, fish and wildlife; agriculture; industrial; and other such uses. To meet that objective, the overall goal is to achieve compliance with water quality standards and criteria for intrastate and interstate waters of the basin, as established by the signatory parties.

Chapter One: Point Source Control Program

SRBC's point source control program goal is to encourage continued upgrading and construction of needed public and private waste treatment facilities. SRBC reviews proposed discharge permits and provides comments to permitting agencies on matters within SRBC jurisdiction. Reviews are oriented toward evaluating potential interstate or regional impacts.

Chapter Two: Nonpoint Source Control Program

SRBC's nonpoint source program goal is the increased control of stormwater runoff and nonpoint source pollution through the fulfillment of the objectives of the Chesapeake Bay Program. These objectives are related to recommendations for monitoring and research of nutrients and toxicants.

Chapter Three: Cost/Benefit Analysis

Not performed.

Chapter Four: Special State Concerns and Recommendations

Acid Mine Drainage

Degradation of streams due to acid mine drainage (AMD) from past coal mining activities is the most widespread water quality problem in the basin. AMD occurs when coal and sulfur-bearing minerals (pyrite) are exposed to oxidizing conditions to form sulfuric acid. The low pH of the water also dissolves metals (iron, manganese and aluminum) from the rock strata, which enter nearby streams.

Remedial action to resolve this problem is being pursued by state and federal agencies, but progress is slow. This is due to the great cost involved and the widespread nature of the problem. Successful abatement projects have been implemented in small areas, but the scope of the problem is so large that it will take many years before AMD-affected streams meet designated uses.

Chesapeake Bay

The Chesapeake Bay Program findings indicate that the Susquehanna River Basin contributes the major portion of nutrients and a significant portion of toxics to the Bay. In order to create a water quality condition necessary to support the living resources of the Bay, the states have agreed to reduce or control point and nonpoint sources of pollution. Programs and policies implemented by Bay states to reduce nutrient and toxic transport to the Bay have produced water quality benefits in the Susquehanna Basin. Future efforts should focus on a continued commitment to reduce nutrients on conventional pollutant discharges and an additional commitment to reduce toxic loadings to the Bay.

Future goals

The Susquehanna River Basin Commission's water quality assessment program includes several goals: (1) to add new stream assessments in the Chemung and Eastern Subbasins; (2) to verify past impaired use assessments through subbasin water quality and biological surveys; (3) to monitor interstate streams and operation of nutrient monitoring stations; (4) to conduct inventories of lakes and wetlands; and (5) to evaluate the feasibility of interfacing with WBS.

APPENDIX A

WATER CLASSIFICATION AND BEST USAGE DEFINITIONS

NEW YORK:

The New York State water-quality classifications are summarized from Water Quality Regulations for Surface Waters and Groundwaters, 6NYCRR Parts 700-705, Effective September 1, 1991, NYS DEC, Division of Water, Albany, New York.

Class AA - The best usages of Class AA waters are as a source of water supply for drinking, culinary or food processing purposes; primary and secondary contact recreation; and fishing. The waters shall be suitable for fish propagation and survival. This classification may be given to those waters that, if subjected to approved disinfection treatment, with additional treatment necessary to remove naturally present impurities, meet or will meet New York State Department of Health drinking water standards, and are or will be considered safe and satisfactory for drinking water purposes.

Class A - The best usages of Class A waters are as a source of water supply for drinking, culinary or food processing purposes; primary and secondary contact recreation; and fishing. The waters shall be suitable for fish propagation and survival. This classification may be given to those waters that, if subjected to approved treatment equal to coagulation, sedimentation, filtration and disinfection, with additional treatment necessary to remove naturally present impurities, meet or will meet New York State Department of Health drinking water standards and are or will be considered safe and satisfactory for drinking water purposes.

Class B - The best usages of Class B waters are primary and secondary contact recreation and fishing. These waters shall be suitable for fish propagation and survival.

Class C - The best usage of Class C waters is fishing. These waters shall be suitable for fish propagation and survival. The water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes.

Class D - The best usage of these waters is fishing. Due to such natural conditions as intermittency of flow, water conditions not conducive to propagation of game fishery, or stream bed conditions, the waters will not support fish propagation. These waters shall be suitable for fish survival. The water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes.

(T) - Suffix added to Classes AA, A, B, C where trout survival is an additional best use to the use classification.

(TS) - Suffix added to Classes AA, A, B, C where trout propagation is an additional best use to the use classification.

PENNSYLVANIA:

The Pennsylvania State water quality classifications are summarized from Water Quality Standards of the Department's Rules and Regulations, 25 Pa. Code, Chapter 93.3-5, Effective August 1989, Pa. DER, Division of Water Quality, Harrisburg, Pennsylvania. All surface waters must meet protected water uses for aquatic life (warm water fishes), water supply (potable, industrial, livestock, and wildlife), and recreation (boating, fishing, water contact sports, and esthetics). The classification of uses is as follows:

EV - Exceptional Value Waters: These waters must meet the statewide list plus are protected at their existing water quality. A stream that constitutes an outstanding national, state, regional or local resource. The water quality in these streams shall not be lowered.

HQ-TSF - High Quality Trout Stocking: The water quality can only be lowered if a discharge is the result of necessary social or economic development, the water quality criteria are met, and all existing uses are protected. Maintenance of stocked trout from February 15 to July 31 and maintenance and propagation of fish species and additional flora and fauna that are indigenous to a warm water habitat.

HQ-CWF - High Quality Cold Water Fishes: The water quality can only be lowered if a discharge is the result of necessary social or economic development, the water quality criteria are met, and all existing uses are protected. Maintenance and/or propagation of fish species including the family of Salmonidae and additional flora and fauna that are indigenous to a cold water habitat.

HQ-WWF - High Quality Warm Water Fishes: The water quality can only be lowered if a discharge is the result of necessary social or economic development, the water quality criteria are met, and all existing uses are protected. Maintenance and propagation of fish species and additional flora and fauna that are indigenous to a warm water habitat.

TSF - Maintenance of stocked trout from February 15 to July 31 and maintenance and propagation of fish species and additional flora and fauna that are indigenous to a warm water habitat.

CWF - Cold Water Fishes: Maintenance and/or propagation of fish species including the family of Salmonidae and additional flora and fauna that are indigenous to a cold water habitat.

WWF - Cold Water Fishes: Maintenance and propagation of fish species and additional flora and fauna that are indigenous to a warm water habitat.

MF - Migratory Fishes: Passage, maintenance and propagation of anadromous and catadromous fishes and other fishes that ascend to flowing waters to complete their life cycle. The MF designation is in addition to other designations when appropriate.

MARYLAND:

The Maryland State water quality classifications are summarized from Water Quality Regulations for Designated Uses, COMAR 26.08.02, Effective November 1, 1993, Maryland Department of the Environment, Annapolis, Maryland. All surface waters must protect public health or welfare; enhance the quality of water; protect aquatic resources; and serve the purposes of the Federal Act. The designated uses are:

USE I - Water Contact Recreation, and Protection of Aquatic Life. This use designation includes waters that are suitable for water contact sports; play and leisure time activities where individuals may come in direct contact with surface water; fishing; the growth and propagation of fish (other than trout), other aquatic life, and wild life; and industrial supply.

USE I-P - Water Contact Recreation, Protection of Aquatic Life, and Public Water Supply. This use includes all uses identified in USE I; and use as a public water supply.

USE II - Shellfish Harvesting Waters. This use designation includes waters where shellfish are propagated, stored, or gathered for marketing purposes; and actual or potential areas for the harvesting of oysters, softshell clams, hardshell clams, and brackish water clams.

USE III - Natural Trout Waters. This use designation includes waters that have the potential for or are suitable for the growth and propagation of trout; and capable of supporting self-sustaining trout populations and their food organisms.

USE III-P - Natural Trout Waters and Public Water Supply. This use includes all uses identified in USE III; and use as a public water supply.

USE IV - Recreational Trout Waters. This use designation includes cold or warm waters that have the potential for or are capable of holding or supporting adult trout for put-and-take fishing; and managed as a special fishery by periodic stocking and seasonal catching.

USE IV-P - Recreational Trout Waters and Public Water Supply. This use includes all uses identified in USE IV; and use as a public water supply.

APPENDIX B

IMPAIRED STREAM REACHES IN THE SUSQUEHANNA RIVER BASIN BY SUBBASIN

Abbreviations Used in Tables B1 Through B6

Source Codes

MW -- Municipal wastes
IW -- Industrial wastes
DW -- Domestic wastes
OPS - Other point sources
AMD - Acid mine drainage
AP - Acid precipitation
AGR - agricultural runoff
URBRO - Urban runoff
ONS - Other nonpoint sources
UNK - Unknown
RESEX - Resource extraction other than coal
LNDF - Landfills
HYDRO - Hydromodification

Cause Codes

UNK - Unknown
TOX -- Toxics
PEST - Pesticide
ORG - Organics
MET - Metals
NH3 - Ammonia
CL - Chlorine
OIN - Other inorganics
NUTR - Nutrients
PH - pH
SILT - Siltation
DO - Organic enrichment/dissolve oxygen
TDS - Dissolved solids
THRM - Thermal modification
FLOW - Flow alteration
HAB - Habitat alterations
BAC - Bacteria/pathogens
OIL - Oil and Grease
ODOR - Taste and odor
SUSP - Suspended solids
AQPL - Noxious aquatic plants
FILL - Filling and draining
SO4 - Sulfate

Table B1. Impaired Stream Reaches in the Chemung Subbasin

Stream Name	Reach from	Reach to	Class	Use Support			Miles Assessed	Source	Cause
				Full	Part	Not			
Beer Creek	Source	Tioga River	CWF			1.1	1.1	AMD	pH
Beaver Brook	0.5 miles upstream of mouth of trib. 2a	Newtown Creek	C	1.1		0.6	1.7	RESEX	SILT
Cenisteo River	Seneca St. Bridge	East Avenue/Ashbaugh Hill Road bridge	C	2.9		0.3	3.2	MW, URBRO	UNK, SILT
Cenisteo River	East Avenue/Ashbaugh Hill Road bridge	Tioga River	C	25.4		5.7	31.1	MW, URBRO	UNK, SILT
Chemung River	Bentley Creek	Pennsylvania state line	C			7.5	7.5	MW, OPS	BAC, MET
Chemung River	Hoffman Brook	Bentley Creek	C		B		B	MW	BAC
Chemung River	New York state line	New York state line	WWF			2	2	OPS	NUTR, BAC
Coal Creek	UNT 31477	Tioga River	CWF			2.2	2.2	AMD	pH
Cohocton River	trib# 22 north of Sherps Hill	Chemung River	C	13.7		6	19.7	AGR, ONS	NUTR, DO, SILT
Cohocton River	Davis Hollow (trib# 45)	trib# 22 north of Sharps Hill	C(T)	18.5		1	19.5	UNK	UNK
Fall Brook	UNT 31522	Tioga River	CWF			5.8	5.8	AMD	pH
Fallows Creek	UNT 31546	Tioga River	CWF		5.9		5.9	AP	pH
Johnson Creek	UNT 31475	Tioga River	CWF		3.9		3.9	AMD	pH
Meads Creek	Source	Steuben County line	C(T)	3.2	5.5		B.7	ONS	SILT
Morris Run	UNT 31492	Tioga River	CWF			5.3	5.3	AMD	pH
Newtown Creek	Diven Creek	Chemung River	C			2.8	2.8	MW	NUTR, BAC
Newtown Creek	Trib. #29 downstream of Erin, NY.	Beaver Brook	C	4.4		6	10.4	RESEX	FLOW
North Fork Cowanesque River	Potter County line	Cowanesque River	CWF		4.5		4.5	AGR	NUTR, SILT
North Fork Cowanesque River	New York state line	Tioga County line	CWF		3.3		3.3	AGR	NUTR, SILT
Post Creek	Source	Steuben County line	C(TS)	1.5	5.6		7.1	ONS, DW	SILT, BAC
South Creek	Source	New York state line	TSF		10.3		10.3	UNK	UNK
South Creek	Pennsylvania state line	Seeley Creek	C		6		6	UNK	UNK
Tioga River	UNT 31567	Crooked Creek	CWF	7.8B		26.12	34	AMD	pH MET
Tioge River	Pennsylvania state line	Chemung River	C		13.1		13.1	AMD	MET SO4
Tioge River	Crooked Creek	New York state line	WWF		6.9		6.9	AMD	MET SO4
Tobehenna Creek	Source	Lamoka Lake	C	5.7	1.3		7	AGR, ONS	NUTR DO
Troups Creek	New York state line	Cowanesque River	CWF		5.2		5.2	ONS	OIL, SUSP

Table B2. Impaired Stream Reaches in the Eastern Subbasin

Stream Name	Reach from	Reach to	Class	Use Support			Miles Assessed	Source	Cause
Brooks Creek	Source	Castle Creek	C	3.7	1		4.7	LNDF	MET
Ballyhack Creek	Source	Ostorne Creek	C		5.9		5.9	ONS, AGR	SILT, NUTR
Brakel Creek	Source	Cortland County line	C		8.4		8.4	ONS, AGR	SILT, NUTR
Brakel Creek	Chenango County line	Otselic River	C		1.9		1.9	ONS, AGR	SILT, NUTR
Canasawacta Creek	Source	Chenango River	B		6.4		6.4	ONS	SILT
Cascade Creek	New York state line	Susquehanna River	CWF		1.7		1.7	UNK	UNK
Catatank Creek	Spencer Lake	Owego Creek	C		22.3		22.3	AGR	SILT, NUTR
Cayute Creek	New York State Line	Susquehanna River	WWF		1.7		1.7	MW	NUTR SUSP CL
Chenango River	Fly Creek	North Norwich/Norwich town line	B		4.6		4.6	AGR, MW	NUTR SILT
Chenango River	Tributary #41	Broome County line	B	9.5	10		19.5	AGR, MW	NUTR
Chenango River	Chenango County line	Susquehanna River	B	9.5	1		10.5	OPS	MET, NUTR, SILT, HAB
Chenango River	North Norwich/Norwich town line	Confluence with tributary #47	B	9.5		10	19.5	MW, AGR	NUTR DO
Chenango River	Confluence with tributary #47	Confluence with tributary #41	C		2.8		2.8	AGR, MW	NUTR
Cold Brook	Source	Chenango River	C(T)	4.8	3		7.8	AGR	NUTR, SILT
Doolittle Creek	trib 1	West Branch Owego Creek	C		2.9		2.9	ONS	SILT
Doolittle Creek	Source	trib 10	C		1.2		1.2	ONS	SILT
Doolittle Creek	trib 10	trib 1	C(T)		4.4		4.4	ONS	SILT
Dudley Creek	Source	Tioughnioga River	C	2.9	5		7.9	AGR	SILT, NUTR
East Branch Owego Creek	Hubby Creek	trib 13	C(T)		3.8		3.8	ONS	NUTR
East Branch Owego Creek	trib 13	trib 6	C	2.7	3.6		6.3	ONS	NUTR
East Branch Owego Creek	Cortland County line	Hubby Creek	C	4.7	2.6		7.3	ONS	NUTR, SILT
East Branch Tioughnioga River	Madison County line	Confluence with tributary #6	C		6.9		6.9	AGR, ONS	SILT
East Branch Tioughnioga River	Confluence with tributary #6	Tioughnioga River	C		3.7		3.7	AGR, ONS	SILT
Febius Creek	Source	West Branch Tioughnioga River	C(T)	3.8	3		6.8	AGR	HAB, THRM, NUTR
Fly Creek	Source	Chenango River	C(T)	3.4	2		5.4	AGR	NUTR, SILT
Jackson Creek	0.3 miles downstream Trib. 7	0.5 miles downstream of Trib 3.	C(TS)		1.5		1.5	ONS	SILT
Jackson Creek	0.5 miles downstream Trib. 3	Chenango County Line	C		0.8		0.8	ONS	SILT
Jackson Creek	Chenango County line	0.3 miles downstream Trib. 7	C		0.3		0.3	ONS	SILT
Little Choconut Creek	Source	Susquehanna River	C	7	2	0.1	9.1	IW, ONS	THRM, SILT
Nanticoke Creek	trib 11	Susquehanna River	C	2.25		5.55	7.8	ONS	SILT, NUTR
Nanticoke Creek	trib 20	trib 11	C(T)	1.25		4.45	5.7	ONS	SILT, NUTR
Otselic Creek	Source	Otselic River	C(T)		5.4		5.4	ONS	HAB, THRM
Otselic River	Cortland County line	Tioughnioga River	C	7.9	1		8.9	ONS	SILT
Otselic River	Confluence with tributary #63	Cortland County line	C		8.1		8.1	ONS, AGR	HAB, THRM, SILT
Otselic River	Chenango County line	Broome County line	C		15.3		15.3	AGR	SILT, NUTR
Page Brook	Chenango County line	Chenango River	C		4.9		4.9	ONS, AGR	SILT
Park Creek	Source	Susquehanna River	C	4.3	1		5.3	DW	NUTR, PATH
Payne Brook	Hamilton	Chenango River	C	0.1		2.2	2.3	MW	DO, BAC
Phelps Creek	Source	Chenango River	C	0.4	3		3.4	ONS	SILT
Pierce Creek	Source	Susquehanna River	C		5.2		5.2	ONS	SILT
Tioughnioga River	Confluence with tributary #52	Confluence with tributary #45	B		4.2		4.2	MW, IW	DO, CL, NUTR, OIL
Tioughnioga River	Confluence of East and West Branches	Confluence with tributary #52	B	0.6		9.2	9.8	MW, IW	DO, CL, NUTR, OIL
Unedilla River	Madison County line	Susquehanna River	B	5.4		14.3	19.7	DW	BAC, DO
Unedilla River	Madison County line	Susquehanna River	B	5.4		14.3	19.7	DW	BAC, DO

Table B3. Impaired Stream Reaches in the Upper Susquehanna Subbasin

Stream Name	Reach from	Reach to	Class	Use Support			Miles Assessed	Source	Cause
Ackerly Creek	South Branch	South Branch Tunkhannock Creek	TSF	4	4.7		8.7	MW	DO
Black Creek	Source	Nescopeck Creek	CWF			23.5	23.5	AMD	pH
Brown Creek	Source	Susquehanna River	CWF	1.2		1.9	3.1	AMD	UNK
Catawissa Creek	Luzerne County line	Rattling Run	CWF			11.3	11.3	AMD	pH
Catawissa Creek	Source	Luzerne County line	CWF			0.7	0.7	AMD	pH
Catawissa Creek	Rattling Run	Columbia County line	TSF			6.7	6.7	AMD	pH
Catawissa Creek	Schuykill County line	Susquehanna River	TSF			20.5	20.5	AMD	pH
Catawissa Creek	Schuykill County line	Schuykill County line	CWF			3.2	3.2	AMD	pH
Coal Brook	Source	Lackawanna River	CWF	0.3		1.9	2.2	AMD	MET
Cranberry Creek	UNT 28124	Black Creek	CWF			1.2	1.2	AMD	UNK
Eddy Creek	UNT 63873	Lackawanna River	WWF	4		3	7	AMD	FLOW
Espy Run	UNT 64625	Nanticoke Creek	CWF			1.7	1.7	AMD	UNK
Fall Brook	UNT 28590	Lackawanna River	CWF	6		1.1	7.1	AMD	FLOW
Grassy Island Creek	Elevation 1100	Leckawanna River	CWF			1.3	1.3	AMD	FLOW
Hunkydory Creek	Reservoir #8	Luzerne County line	CWF	0.2		0.4	0.6	AMD	UNK
Hunkydory Creek	Schuykill County line	Catawissa Creek	CWF			0.8	0.8	AMD	UNK
Keyser Creek	Source	Lackawanna River	CWF	1.5		4.8	6.3	AMD	FLOW
Lackawanna River	Rush Brook	Luzerne County line	WWF		22.6		22.6	MW, URBRO	DO, HAB
Lackawanna River	Lackawanna County line	Susquehanna River	WWF			2.6	2.6	AMD	MET
Little Nescopeck Creek	Source	Nescopeck Creek	CWF			9.1	9.1	AMD	pH
Little Tomhickon Creek	Source	Tomhickon Creek	CWF			1	1	AMD	UNK
Lucky Run	Source	Keyser Creek	CWF	1.9		0.9	2.8	AMD	FLOW
Meadow Brook	Source	Lackawanna River	CWF			2.1	2.1	AMD	FLOW
Mill Creek	Source	Susquehanna River	CWF	13.7	0.5		14.2	URBRO	HAB
Mill Creek	Source	Lackawanna River	CWF	2.7		4.1	6.8	AMD	FLOW
Nanticoke Creek	Source	Susquehanna River	CWF	1.4		3.6	5	AMD	pH
Nescopeck Creek	PA 309 Bridge	Susquehanna River	TSF	12.2		13.5	25.7	AMD	pH
Newport Creek	Source	Susquehanna River	CWF			4.8	4.8	AMD	pH
Pettis Creek	Source	Wyalusing Creek	WWF	3.1	0.5		3.6	MW	DO
Powderly Creek	Source	Lackawanna River	CWF			1.9	1.9	AMD	MET
Red Spring Run	Lackawanna County line	Lackawanna River	CWF			0.6	0.6	AMD	FLOW
Solomon Creek	Source	Susquehanna River	CWF	4.2	3.3	1.5	9	AMD	pH
South Branch	UNT 28346	Newport Creek	CWF			3.4	3.4	AMD	UNK
South Branch Wyalusing Creek	Source	East Branch Wyalusing Creek	WWF		9		9	AGR	NUFR
St Johns Creek	UNT 28381	Lackawanna River	CWF	1.2		4.8	6	AMD	FLOW
Stafford Meadow Brook	Lower Moosic/Scranton line	Lackawanna River	WWF		2.4		2.4	URBRO	HAB
Sterry Creek	Source	Lackawanna River	CWF	1.4		2.4	3.8	AMD	FLOW
Stony Creek	UNT 28122	Cranberry Creek	CWF	2.4		0.8	3.2	AMD	UNK
Sugar Run Creek	Source	Sugar Run Creek	CWF	9	0.5		9.5	IW	UNK
Toby Creek	Source	Susquehanna River	CWF	9.1	1.4	1	11.5	UNK	TDS
Tomhickon Creek	Source	Schuykill County line	CWF			4.3	4.3	AMD	pH
Tomhickon Creek	Luzerne County line	Catawissa Creek	CWF			6.3	6.3	AMD	pH
Wadham Creek	Source	Susquehanna River	CWF			1.1	1.1	AMD	UNK
Warrior Creek	UNT 28351	Susquehanna River	CWF			1.2	1.2	AMD	UNK
Wildcat Creek	Source	Lackawanna River	CWF	2.4		0.9	3.3	AMD	FLOW
Wilson Creek	Source	Lackawanna River	CWF	3		0.6	3.6	AMD	MET
Wyalusing Creek	Susquehanna County line	Susquehanna River	WWF	10.7	4		14.7	DW	DO

Table B4. Impaired Stream Reaches in the West Branch Susquehanna Subbasin

Stream Name	Reach from	Reach to	Class	Use Support		Miles		Source	Cause
Abes Run	Source	West Branch Susquehanna River	CWF	Full	Part	Not	Assessed	AMD?	
Akely Hollow	UNT 64571	Sterling Run	HQ-CWF	2.4			2.4	AMD?	
Albert Run	Source	Little Laurel Run	CWF	1.2			1.2	AMD?	
Alder Run	UNT 64554	West Branch Susquehanna River	CWF	1.7			1.7	AMD?	
Ames Run	Source	Moshannon Creek	CWF			10.7	10.7	AMD	MET
Amos Branch	UNT 25546	Birch Island Run	HQ-CWF	1.7			1.7	AMD?	
Anderson Creek	Dubois Reservoir	West Branch Susquehanna River	CWF	0		1.6	1.6	AMD	MET
Babb Creek	Source	Pine Creek	CWF	4.5		10.3	14.8	AMD	MET
Bald Hill Run	Source	West Branch Susquehanna River	CWF	7.5		14	21.5	AMD	MET
Banton Run	Source	Muddy Run	CWF	2.7			2.7	AMD?	
Bark Camp Run	Source	Bennett Branch Sinnemahoning Creek	CWF	1			1	AMD?	
Basin Run	UNT 25919	West Branch Susquehanna River	CWF	3.6			3.6	AMD?	
Beer Run	Source	West Branch Susquehanna River	CWF	1.2			1.2	AMD?	
Beer Run	Source	Moshannon Creek	CWF	1.2			1.2	AMD?	
Bear Run	Source	West Branch Susquehanna River	CWF	3.3			3.3	AMD?	
Bear Run	Indiana County line	West Branch Susquehanna River	CWF			2.9	2.9	AMD	MET
Bear Run	UNT 27065	Clearfield County line	CWF	3.7			3.7	AMD?	
Beever Run	UNT 25886	Moshannon Creek	CWF	6.5			6.5	AMD?	
Beech Creek	Big Run	Bald Eagle Creek	CWF			5.6	5.6	AMD	MET
Beech Creek	North/South Forks Beech Creek	Big Run	CWF			16.1	16.1	AMD	MET
Beech Creek	Big Run	Bald Eagle Creek	CWF			5.6	5.6	AMD	MET
Bell Run	UNT 26754	West Branch Susquehanna River	CWF	7.9			7.9	AMD?	
Bender Run	Source	May Hollow Run	CWF	1.9			1.9	AMD?	
Bennett Branch Sinnemahoning Creek	Clearfield County line	Cameron County line	WWF			24	24	AMD	MET
Bennett Branch Sinnemahoning Creek	Cameron County line	Sinnemahoning Creek	WWF			8.8	8.8	AMD	MET
Bennett Branch Sinnemahoning Creek	McCracken Run	Elk County line	WWF	6.4		4.8	11.2	AMD	MET
Big Run	UNT 25877	Moshannon Creek	CWF	1.7			1.7	AMD?	
Birch Island Run	UNT 25548	West Branch Susquehanna River	HQ-CWF	0		6.2	6.2	AMD	MET
Black Moshannon Creek	Shirks Run	Moshannon Creek	HQ-CWF	18.6	1		19.6	AMD	MET
Blein Run	UNT 26358	Clearfield Creek	CWF	3.5			3.5	AMD?	
Bloody Run	Source	Burns Run	EV	1			1	AP?	
Bloody Run	Source	West Branch Susquehanna River	CWF	1.3			1.3	AMD?	
Blue Run	UNT 26295	Clearfield Creek	CWF	0.8			0.8	AMD?	
Boake Run	UNT 25582	Sterling Run	HQ-CWF	1.8			1.8	AMD?	
Brady Run	UNT 27108	Cush Creek	CWF	2			2	AMD?	
Brewery Run	Source	West Branch Susquehanna River	HQ-CWF	1.8			1.8	AMD?	
Browns Run	UNT 25766	Moshannon Creek	CWF	2.4			2.4	AMD?	
Browns Run	UNT 25930	Alder Run	CWF	2.7			2.7	AMD?	
Buck Run	UNT 26290	Porter Run	CWF	1.2			1.2	AMD?	
Buckeye Run	Jack Cammalls Camp Run	Otter Run	CWF	0	0.9		0.9	AMD	MET
Burns Run	UNT 25490	Centre County line	EV	3.8			3.8	AP?	
Burns Run	Clinton County line	West Branch Susquehanna River	EV	0.8			0.8	AP?	
Campbell Run	UNT 62980	Little Clearfield Creek	CWF	0.2			0.2	AMD?	
Carson Run	Source	Little Clearfield Creek	CWF	2			2	AMD?	
Chatham Run	Chatham Water Co. reservoir #2	West Branch Susquehanna River	CWF	2.1	2		4.1	UNK	UNK
Cherry Run	UNT 24902	Bennett Branch Sinnemahoning Creek	CWF	3.6			3.6	AMD?	

AMD? - Indicates evaluated stream reaches based on maps, observation, and knowledge of the area.

Table B4. Impaired Stream Reaches in the West Branch Susquehanna Subbasin (Continued)

Stream Name	Reach from Source	Reach to	Class	Use Support			Miles Assessed	Source	Cause
Cherry Run	Source	North Fork Beech Creek	CWF	Full	Part	Not	0.9	AMD	MET
Clearfield Creek	Cambria County line	West Branch Susquehanna River	WWF				44.2	AMD	MET
Clearfield Creek	UNT 26605	Clearfield County line	WWF		27.7		27.7	AMD	MET
Coal Run	UNT 25880	Beaver Run	CWF	3.7			3.7	AMD?	
Cofinan Run	UNT 26298	Clearfield Creek	CWF	1.4			1.4	AMD?	
Cold Stream	US 322	Moshannon Creek	CWF			1	1	AMD	MET
Cooks Run	Onion Run	West Branch Susquehanna River	CWF	2.1		3.3	5.4	AMD	MET
Crooked Run	UNT 26056	Trout Run	HQ-CWF	1.5			1.5	AMD?	
Curleys Run	Source	Mosquito Creek	HQ-CWF			1.2	1.2	AMD	MET
Dale Run	UNT 26017	Moravian Run	CWF	0.4			0.4	AMD?	
Deer Creek	UNT 26008	West Branch Susquehanna River	CWF	4		5	9	AMD	MET
Devils Run	Source	West Branch Susquehanna River	CWF	1.8			1.8	AMD?	
Dewitt Run	Source	Clearfield Creek	CWF	1.1			1.1	AMD?	
Drury Run	Sandy Run	Woodley Hollow	HQ-CWF			0.58	0.58	AMD	MET
Drury Run	Woodley Hollow	West Branch Susquehanna River	CWF			2.78	2.78	AMD	MET
Dutch Run	Kibler Run	Beaverdam Run	CWF	1.4			1.4	AMD?	
East Branch Little Muddy Run	UNT 26251	Little Muddy Creek	CWF	1.1			1.1	AMD?	
Emigh Run	UNT 25830	Moshannon Creek	CWF	2.7			2.7	AMD?	
Fenton Run	UNT 26663	Bliger Run	CWF	1.6			1.6	AMD?	
Flat Run	Source	Alder Run	CWF	1.9			1.9	AMD?	
Flegals Run	Source	Lick Run	HQ-CWF	1.9			1.9	AMD?	
Forcey Run	UNT 26113	Roaring Run	CWF	0.9			0.9	AMD?	
Fork Run	Source	Lick Run	HQ-CWF	3.5			3.5	AMD?	
Fox Run	UNT 27266	West Branch Susquehanna River	CWF	2.6			2.6	AMD?	
Gazzam Run	Confluence of Stoney and Green Runs	Little Clearfield Creek	CWF	2.3			2.3	AMD?	
Goss Run	Source	Beaver Run	CWF	1.41		0.48	1.89	AMD	PH
Gressflat Run	Knox Run	Moshannon Creek	CWF	0.4			0.4	AMD?	
Hawk Run	UNT 25823	Moshannon Creek	CWF	1.8			1.8	AMD?	
Horton Run	Source	Cush Creek	CWF	2.5			2.5	AMD?	
Hubler Run	UNT 25939	Alder Run	CWF	0.7			0.7	AMD?	
Jake Run	Source	Roaring Run	CWF	1.6			1.6	AMD?	
Japling Run	Alexander Run	Clearfield Creek	CWF	0.3			0.3	AMD?	
Jerry Run	Source	Lick Run	HQ-CWF	2.3			2.3	AMD?	
Kettle Creek	Potter County line	West Branch Susquehanna River	HQ-TSF	19.2	2	3	24.2	AMD	MET
Kettle Spring Run	Source	Alder Run	CWF	2			2	AMD?	
Kibler Run	UNT 26375	Dutch Run	CWF	1.2			1.2	AMD?	
Knox Run	Source	Grassflat Run	CWF	1			1	AMD?	
Kratzer Run	UNT 26671	Anderson Creek	CWF	0		5.1	5.1	AMD	MET
Leurel Run	UNT 24620	Moshannon Creek	CWF			5.4	5.4	AMD	MET
Laurel Run	UNT 26120	Little Clearfield Creek	CWF	1.2			1.2	AMD?	
Leurel Run	UNT 25625	West Branch Susquehanna River	HQ-CWF	2.4			2.4	AMD?	
Left Fork Otter Run	Source	Otter Run	CWF		1.5		1.5	AMD	MET
Leslie Run	UNT 27276	West Branch Susquehanna River	CWF	1.1			1.1	AMD?	
Lick Run	Source	West Branch Susquehanna River	HQ-CWF	3.2	4.5	3.7	11.4	AMD, AP	MET, pH
Little Anderson Creek	UNT 26695	Anderson Creek	CWF			5.7	5.7	AMD	MET

AMD? - Indicates evaluated stream reaches based on maps, observation, and knowledge of the area.

Table B4. Impaired Stream Reaches in the West Branch Susquehanna Subbasin (Continued)

Stream Name	Reach from	Reach to	Class	Use Support			Miles	Source	Cause
				Full	Part	Not			
Little Beaver Run	UNT 25B82	Beaver Run	CWF	0.7			0.7	AMD?	
Little Birch Island Run	UNT 25537	Birch Island Run	HQ-CWF	0		4.3	4.3	AMD?	MET
Little Bougher Run	Source	West Branch Susquehanna River	HQ-CWF	1.5			1.5	AMD?	
Little Bougher Run	Source	West Branch Susquehanna River	CWF			1.1	1.1	AMD?	MET
Little Deer Creek	UNT 26001	Deer Creek	CWF	2.1			2.1	AMD?	
Little Laurel Run	UNT 25B59	Laurel Run	CWF	3			3	AMD?	
Little Muddy Run	Janesville Sportsmens Dam	Muddy Run	CWF	3.1			3.1	AMD?	
Little Potts Run	Source	Potts Run	CWF	1.5			1.5	AMD?	
Little Sandy Run	UNT 22794	North Fork Beech Creek	CWF			2.7	2.7	AMD?	MET
Little Surveyor Run	Source	Surveyor Run	CWF			2	2	AMD?	MET
Little Trout Run	UNT 26050	Trout Run	HQ-CWF	6.6			6.6	AMD?	
Logway Run	Source	Beech Creek	CWF			0.8	0.8	AMD?	MET
Long Run	Source	Cleefield Creek	CWF	2			2	AMD?	
Long Run	UNT 27246	Moss Run	CWF	0.4			0.4	AMD?	
Loop Run	UNT 25572	West Branch Susquehanna River	CWF			2.4	2.4	AMD?	MET
Loop Run	UNT 25572	West Branch Susquehanna River	HQ-CWF	2.5			2.5	AMD?	
Lost Run	UNT 26232	Cleefield Creek	CWF	2.2			2.2	AMD?	
Lower Three Runs	Clinton County line	West Branch Susquehanna River	HQ-CWF	0.2			0.2	AMD?	
Lower Three Runs	Cameron County line	Cleefield County line	HQ-CWF	5.8			5.8	AMD?	MET
Loyalsock Creek	Wyoming County line	Lycoming County Line	CWF	13		25	38	AMD?	pH
Mackeys Run	UNT 19731	The Outlet	HQ-CWF	1.1	0.5		1.6	AP	DO
Marsh Creek	Straight Run	Pine Creek	TSF	1.4		1.8	3.2	MW	DO
Marsh Creek	Source	Straight Run	WWF	10.9		3.3	14.2	MW	DO
Mey Hollow Run	Bender Run	Sterling Run	CWF	3.1			3.1	AMD?	
McCracken Run	UNT 26759	West Branch Susquehanna River	CWF	1.7			1.7	AMD?	
McNeel Run	UNT 26160	Gazem Run	CWF	1.4			1.4	AMD?	MET
Middle Branch Two Mile Run	Source	Two Mile Run	HQ-TSF			2.1	2.1	AMD?	
Miles Run	Source	Sterling Run	HQ-CWF	1.3			1.3	AMD?	
Millstone Run	Source	West Branch Susquehanna River	CWF	3.4			3.4	AMD?	
Mons Run	UNT 25936	Alder Run	CWF	0.8			0.8	AMD?	
Montgomery Creek	Cleefield Reservoir	West Branch Susquehanna River	CWF	0.7		2.2	2.9	AMD?	MET
Moose Creek	Moose Creek Reservoir	West Branch Susquehanna River	CWF	2.4			2.4	AMD?	
Moose Run	Source	Bennett Branch Sinnemehoning Creek	CWF	2.4			2.4	AMD?	
Morevien Run	UNT 26020	West Branch Susquehanna River	CWF	6			6	AMD?	
Moshannon Creek	UNT 25911	West Branch Susquehanna River	TSF	1.7		26.2	27.9	AMD?	MET
Moshannon Creek	UNT 25911	West Branch Susquehanna River	TSF	1.7		26.2	27.9	AMD?	MET
Mosquito Creek	Elk County line	West Branch Susquehanna River	HQ-CWF	11.3		6	17.3	AMD?	MET
Moss Creek	UNT 27251	West Branch Susquehanna River	CWF	5			5	AMD?	
Mountain Branch	Trim Root Run	Moshannon Creek	CWF	2.3			2.3	AMD?	
Mowry Run	Source	West Branch Susquehanna River	CWF	1.3			1.3	AMD?	
North Fork Beech Creek	UNT 22797	Beech Creek	CWF			5.9	5.9	AMD?	MET
Onemile Run	UNT 25826	Moshannon Creek	CWF	1.2			1.2	AMD?	
Otter Run	Right Fork Otter Run	Little Pine Creek	CWF	0		3.8	3.8	AMD?	MET
Owl Run	Source	Burns Run	EV	1.1			1.1	AP?	
Packer Fork	Source	Burns Run	EV	1.6			1.6	AP?	

AMD? - Indicates evaluated stream reaches based on maps, observation, and knowledge of the area.

Table B4. Impaired Stream Reaches in the West Branch Susquehanna Subbasin (Continued)

Stream Name	Reach from	Reach to	Class	Use Support			Miles	Cause
				Full	Pert	Not	Assessed	Source
Passmore Run	UNT 26729	West Branch Susquehanna River	CWF	0.7			0.7	AMD?
Pine Run	UNT 26054	Trout Run	HQ-CWF	1.1			1.1	AMD?
Pine Run	UNT 26310	Clearfield Creek	CWF	1.3			1.3	AMD?
Pine Run	UNT 26235	Clearfield Creek	CWF	4			4	AMD?
Pine Run	UNT 25577	Sterling Run	HQ-CWF	2			2	AMD?
Portable Run	Miller Hollow	Sterling Run	CWF	0.6			0.6	AMD?
Porter Run	Source	West Branch Susquehanna River	CWF	1.7			1.7	AMD?
Porter Run	Buck Run	Clearfield Creek	CWF	1.6			1.6	AMD?
Potter Run	Source	West Branch Susquehanna River	CWF	1.8			1.8	AMD?
Red Run	Cameron County line	Mix Run	HQ-CWF	3.4			3.4	AMD?
Red Run	UNT 20783	Lycoming Creek	CWF			3.9	3.9	MET
Right Fork Otter Run	UNT 21264	Otter Run	CWF	0	0.4		0.4	MET
Roaring Run	Forcey Run	Clearfield Creek	CWF	5.6			5.6	AMD?
Rock Run	Source	West Branch Susquehanna River	CWF	2.4			2.4	AMD?
Rolling Stone Run	UNT 25923	West Branch Susquehanna River	CWF	1.3			1.3	AMD?
Roup Run	Source	Moshannon Creek	CWF	1.8			1.8	AMD?
Rupley Run	Source	West Branch Susquehanna River	CWF	1.5			1.5	AMD?
Saltlick Run	UNT 25619	West Branch Susquehanna River	HQ-CWF			1.5	1.5	MET
Sandy Creek	Big Sandy Run	West Branch Susquehanna River	CWF	7.8			7.8	AMD?
Sandy Run	Source	Drury Run	HQ-CWF	1.77		2	3.77	AMD
Sevenmile Run	Source	Moshannon Creek	CWF	2.7			2.7	AMD?
Shimel Run	Source	Moshannon Creek	CWF	3.2			3.2	AMD?
Simeling Run	Source	Laurel Run	CWF	2.5			2.5	AMD?
Sinnemehoning Creek	Cameron County line	West Branch Susquehanna River	WWF			9.1	9.1	MET
Sinnemehoning Creek	Bennett/Driftwood Branches	Clinton County line	WWF			6.7	6.7	MET
Slab Cabin Run	PA Rt 26	Spring Creek	CWF	5.3		1	6.3	DO
South Branch Bear Run	UNT 27053	Bear Run	CWF	5.2			5.2	AMD?
Spring Creek	Source	PA 550 Bridge	HQ-CWF	3.6	17.8		21.38	PEST
Spring Creek	Pa 550 Bridge	Bald Eagle Creek	CWF	0	3.72		3.72	PEST
Spring Run	UNT 24723	Trout Run	CWF	8.5			8.5	AMD?
Sterling Run	Miles Run	West Branch Susquehanna River	HQ-CWF	0		7.2	7.2	MET
Sterling Run	Portable Run	Driftwood Branch Sinnemehoning Creek	CWF	2.3			2.3	AMD?
Stone Run	UNT 26094	Lick Run	HQ-CWF	2.6			2.6	AMD?
Stony Brook	UNT 24716	Spring Run	CWF	1.1			1.1	AMD?
Stony Run	Source	Drury Run	CWF	0.7		2.6	3.3	MET
Stump Lick Run	UNT 26048	Little Trout Run	HQ-CWF	3.1			3.1	AMD?
Sulphur Run	UNT 25809	Moshannon Creek	CWF	1.1			1.1	AMD?
Sulphur Run	UNT 26039	Millstone Run	CWF	1.3			1.3	AMD?
Surveyor Run	Source	West Branch Susquehanna River	CWF			4	4	MET
Susmen Run	Source	Mosquito Creek	HQ-CWF	1.1			1.1	AMD?
Tengescootack Creek	UNT 23383	West Branch Susquehanna River	CWF		8.4		8.4	MET
Trout Run	UNT 26076	West Branch Susquehanna River	HQ-CWF	8.8	5		13.8	pH
Trout Run	UNT 24771	Bennett Branch Sinnemehoning Creek	CWF	10.9			10.9	AMD?
Trout Run	UNT 25872	Moshannon Creek	CWF	3.3			3.3	AMD?
Two Mile Run	Middle Branch Two Mile Run	Kettle Creek	HQ-TSF			1.9	1.9	MET

AMD? - Indicates evaluated stream reaches based on maps, observation, and knowledge of the area.

Table B4. Impaired Stream Reaches in the West Branch Susquehanna Subbasin (Continued)

Stream Name	Reach from	Reach to	Class	Use Support			Miles	Source	Cause
				Full	Part	Not	Assessed		
Tyler Run	Elk County line	Bennett Branch County line	CWF	1			1	AMD?	
Tyler Run	UNT 24907	Clearfield County line	CWF	0.5			0.5	AMD?	
Upper Three Runs	UNT 25610	West Branch Susquehanna River	HQ-CWF	8.8			8.8	AP?	
Valley Fork Run	UNT 26111	Roaring Run	CWF	1.8			1.8	AMD?	
Walnut Run	UNT 27255	West Branch Susquehanna River	CWF	1.1			1.1	AMD?	
Watts Creek	Source	Little Clearfield Creek	CWF	3.8			3.8	AMD?	
West Branch Susquehanna River	Clinton County line	Clinton County line	WWF			7.4	7.4	AMD	MET
West Branch Susquehanna River	Clearfield County line	Centre County line	WWF			7.4	7.4	AMD	MET
West Branch Susquehanna River	UNT 27283	Clearfield County line	WWF			13.5	13.5	AMD	MET
West Branch Susquehanna River	Centre County line	Clinton County line	WWF	0	0	4.9	4.9	AMD	MET
West Branch Susquehanna River	Clearfield County line	Clinton County line	WWF			4.9	4.9	AMD	MET
West Branch Susquehanna River	Centre County line	Lycorning County line	WWF	8.9		43.2	52.1	AMD	MET
West Branch Susquehanna River	Centre County line	Centre County line	WWF	24.9	20.4	47.6	92.9	AMD	MET
West Branch Susquehanna River	Cambla County line	Centre County line	WWF	2.7			2.7	AMD?	
Whiteside Run	UNT 25902	Moshannon Creek	CWF	2.7			2.7	AMD?	
Wilson Creek	Source	Babb Creek	CWF	9.3		2.3	11.6	AMD	MET
Wise Run	Source	Laurel Run	HQ-CWF	1.8			1.8	AMD?	
Wolf Run	Source	West Branch Susquehanna River	CWF	2			2	AMD?	
Wolf Run	Source	Moshannon Creek	CWF	0.9			0.9	AMD?	
Woodley Hollow	Source	Drury Run	CWF			1.7	1.7	AMD	MET

AMD? - Indicates evaluated stream reaches based on maps, observation, and knowledge of the area.

Table B5. Impaired Stream Reaches in the Juniata Subbasin

Stream Name	Reach from	Reach to	Cless	Use Support		Not	Miles Assessed	Source	Cause
Adams Run	Source	Dunning Creek	WWF	Full	Part		4.70	MW	DO
Beaverdam Branch Juniata River	Source	Frankstown Branch Juniata River	WWF	3.40	1.30	14.00	14.00	MW	DO
Blair Gap Run	Source	Beaverdam Branch	WWF	9.10		0.40	9.50	MW	DO
Burgoon Run	Lake Altoona	Beaverdam Branch	WWF			3.00	3.00	AMD	MET
Frankstown Branch Juniata River	Halter Creek	Piney Creek	WWF		12.00		12.00	IW, MW	DO, CL
Great Trough Creek	Bedford County line	Raystown Branch Juniata River	TSF	24.10		3.00	27.10	MW	UNK
Halter Creek	Bedford County line	Frankstown Branch Juniata River	WWF		6.60		6.60	IW	DO
Halter Creek	Source	Blair County line	WWF			2.80	2.80	IW	DO
Jacks Creek	Meadows Creek	Juniata River	TSF	6.30	2.00		8.30	IW	UNKTOX
Kishacoquillas Creek	Source	Tea Creek	TSF	12.60		5.00	17.60	AGR	SILT
Kishacoquillas Creek	Tea Creek	Juniata River	TSF	4.10		2.70	6.80	IW, MW	MET, DO
Little Juniata River	Source	Downstream Huntingdon County line	TSF	10.00	6.00	2.00	18.00	IW, MW	UNK
Plum Creek	Source	Halter Creek	WWF	3.10	2.00	1.50	6.60	MW	DO
Sugar Run	Source	Little Juniata River	WWF			2.50	2.50	IW	UNKTOX
Sugar Run	Source	Beaverdam Branch	WWF			6.30	6.30	AMD	MET
Yellow Creek	Blair County line	Raystown Branch Juniata River	HQ-CWF	15.70	4.00		19.70	MW	UNK

Table B6. Impaired Stream Reaches in the Lower Susquehanna Subbasin

Stream Name	Reach from	Reach to	Class	Use Support		Not	Miles		Source	Cause
				Full	Part		Assessed			
Bear Creek	UNT 17043	Wiconisco Creek	WWF			4.4	4.4		AMD	MET
Beaver Creek	Source	Adams County line	WWF		0.5		0.5		MW	DO
Beaver Creek	Adams County line	West Conewago Creek	WWF	1.4	0.5	1	2.9		MW	DO
Beaver Creek	York County line	West Conewago Creek	WWF	1.5	0.4	1	2.9		MW	DO
Big Beaver Creek	Quarryville Sewage Treatment Plant	Pequea Creek	TSF	6.9	0.6	0.5	8		MW	DO
Big Branch Deer Creek	Source	Maryland State Line	WWF		1.36		1.36		UNK	UNK
Big Branch Deer Creek	Pennsylvania State Line	Mouth et Deer Creek	III-P		4.2B		4.28		UNK	UNK
Carbon Run	UNT 1B649	Shamokin Creek	WWF			3.7	3.7		AMD	MET
Chickies Creek	Lebanon County line	Susquehanna River	WWF	2.9	27		29.9		AGR	NUTR
Coal Run	Gebhard Run	Middle Creek	WWF			1.6	1.6		AMD	MET
Coal Run	Source	Shamokin Creek	WWF			3	3		AMD	MET
Coclico Creek	Blue Lake	Conestoga Creek	WWF	21.3	5.3		26.6		AGR	NUTR
Codorus Creek	Oil Creek	Susquehanna River	WWF		20	5	25		MW, IW	TDS, MET
Conestoga Creek	Source	Susquehanna River	WWF	35	25		60		AGR	NUTR
Conodoguin Creek	Franklin County line	Susquehanna River	WWF	60.7	9		69.7		MW	NUTR
Conowingo Creek	Pennsylvania State line	Susquehanna River	I-P			4	4		AGR	NUTR
Conowingo Creek	Source	Maryland State line	WWF			15.6	15.6		AGR	NUTR
Crib Run	UNT 17672	Mahanoy Creek	WWF			1.3	1.3		AMD	MET
Deep Creek	Source	Pine Creek	WWF	17.7	4.5		22.2		AMD	TDS
Deer Creek	Source	Maryland State line	WWF		7.2		7.2		UNK	UNK
Doc Smith Run	UNT 17020	West Branch Rattling Creek	HQ-CWF			1.5	1.5		AMD	MET
East Branch Octoraro Creek	Confluence of Buck Run & Valley Ck	Octoraro Lake at E. and W. Branch confluence	TSFmf	7.1	1		8.1		MW	DO
East Branch Octoraro Creek	Confluence of Buck Run & Valley Ck	Octoraro Lake at E. end W. Branch confluence	TSFmf	7.1	1		8.1		MW	DO
East Branch Rattling Creek	UNT 17040	Rattling Creek	HQ-CWF			3.8	3.8		AMD	MET
East Branch Rausch Creek	UNT 17269	Rausch Creek	WWF			1.9	1.9		AMD	MET
East Conewago Creek	Lebanon County line	Susquehanna River	TSF	8.4		0.9	9.3		MW	NUTR
East Conewago Creek	Lebanon County line	Susquehanna River	TSF	8.4		0.9	9.3		MW	NUTR
Ebaughs Creek	Source	Maryland State Line	WWF	4.11	2.0B		6.19		MW	CL
Felling Branch Deer Creek	Pennsylvania State Line	Mouth at Deer Creek	IV-P		4.7		4.7		AGR	SILT
Felling Branch Deer Creek	Source at pond in Fawn Grove, Pa.	Maryland State Line	WWF		1.25		1.25		AGR	SILT
Gebhard Run	Source	Coal Run	WWF			1.9	1.9		AMD	MET
Good Spring Creek	UNT 10082	Middle Creek	WWF			5	5		AMD	MET
Little Mahanoy Creek	Source	Mahanoy Creek	WWF	4.5		2	6.5		AMD	MET
Little Muddy Creek	Source	Lancaster County line	TSF		3.3		3.3		MW	DO
Little Muddy Creek	Berks County line	Muddy Creek	TSF	2	5		7		MW	DO
Locust Creek	18656	Shamokin Creek	WWF			1.6	1.6		AMD	MET
Lorberry Creek	Stumps Run	Lower Rausch Creek	WWF			1.7	1.7		AMD	MET
Lower Rausch Creek	Source	Swatara Creek	WWF			3.9	3.9		AMD	MET
Mahanoy Creek	Source	Northumberland County line	WWF			26.8	26.8		AMD	MET
Mahanoy Creek	Schuylkill County line	Susquehanna River	WWF			25.4	25.4		AMD	MET
Menns Run	Stream mile 1.0	Susquehanna River	WWF			1	1		AGR	NUTR
Middle Creek	Coal Run	Swatara Creek	WWF			1.1	1.1		AMD	MET
Mill Creek	Source	Conestoga Creek	WWF	6.5	1B.5	2.7	27.7		AGR, MW	NUTR, DO
Nine O'clock Run	UNT 17038	East Branch Rattling Creek	HQ-CWF			0.6	0.6		AMD	MET
North Branch Shamokin Creek	Source	Shamokin Creek	WWF			4.6	4.6		AMD	MET

Table B6. Impaired Stream Reaches in the Lower Susquehanna Subbasin (Continued)

Stream Name	Reach from	Reach to	Class	Use Support		Miles Assessed	Source	Cause
North Mahanoy Creek	UNT 17692	Mahanoy Creek	CWF	Full	Part	Not		
Octoraro Creek	Pennsylvania State line	Susquehanna River	IV-P		8.6	5.5	AMD	MET
Panther Creek	Source	Swatara Creek	CWF			1.8	AMD	UNK
Pexton Creek	Source	Susquehanna River	WWF	7.9	2	2.9	URBRO	MET
Pequea Creek	Source	Susquehanna River	WWF	47.3	5	52.3	AGR	NUTR
Pine Creek	Source	Dauphin County line	CWF	14.5	8.3	22.8	AMD	TDS
Poplar Creek	Source	Good Spring Creek	CWF			0.9	AMD	MET
Queker Run	UNT 18653	Shamokin Creek	CWF			1.3	AMD	MET
Quittephilla Creek	Source	Swatara Creek	TSF	1	10.6	4.9	AGR, IW	NUTR, MET
Rattling Creek	East/West Branches	Wiconisco Creek	HQ-CWF			2.2	AMD	MET
Reusch Creek	Confluence of E. and W. Branches	Pine Creek	CWF			1.7	AMD	MET
Scott Creek	Source starts at PA/MD State Line	Muddy Creek	TSF			3	DW	NUTR, MET
Shale Run	UNT 17025	West Branch Rattling Creek	HQ-CWF			0.8	AMD	MET
Shamokin Creek	Source	Susquehanna River	WWF			34.7	AMD	MET
Shawnee Run	Source	Susquehanna River	WWF	6.6		0.9	IW	MET
Shenandoah Creek	Kehly Run	Mahanoy Creek	CWF			5	AMD	MET
South Branch Codorus Creek	Glen Rock	Codorus Creek	WWF	4.5	10		AGR, DW	NUTR, BAC
Spring Creek	Rt. 422 Bridge	Swatara Creek	WWF	2.5	0.3	2.8	MW	DO
Stone Cabin Run	UNT 17034	East Branch Rattling Creek	HQ-CWF			1.8	AMD	MET
Stream Name	Reach from	Reach to	Class	Attained	Part	Not	Source	
Stumps Run	Source	Lorberry Creek	CWF			0.6	AMD	MET
Swatara Creek	Source	Lebanon County line	CWF			9.8	AMD	MET
Swetare Creek	Schuylkill County line	Swatara Gap	CWF			3.4	AMD	MET
West Branch Rattling Creek	Wolf Run	Rattling Creek	HQ-CWF			5.2	AMD	MET
West Branch Rausch Creek	Source	Rausch Creek	CWF			3.5	AMD	MET
White Horse Run	Source near Meadville School	Pequea Creek	WWF		4.55		AGR	NUTR
Wiconisco Creek	Schuylkill County line	Susquehanna river	WWF	34		27.8	AMD	MET
Wiconisco Creek	Source	Dauphin County line	WWF			6.4	AMD	MET
Zerbe Run	UNT 17643	Mahanoy Creek	CWF			5.8	AMD	MET

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